



# **Weather101:**

## **Flash Flooding: The #1 Severe Weather Threat**

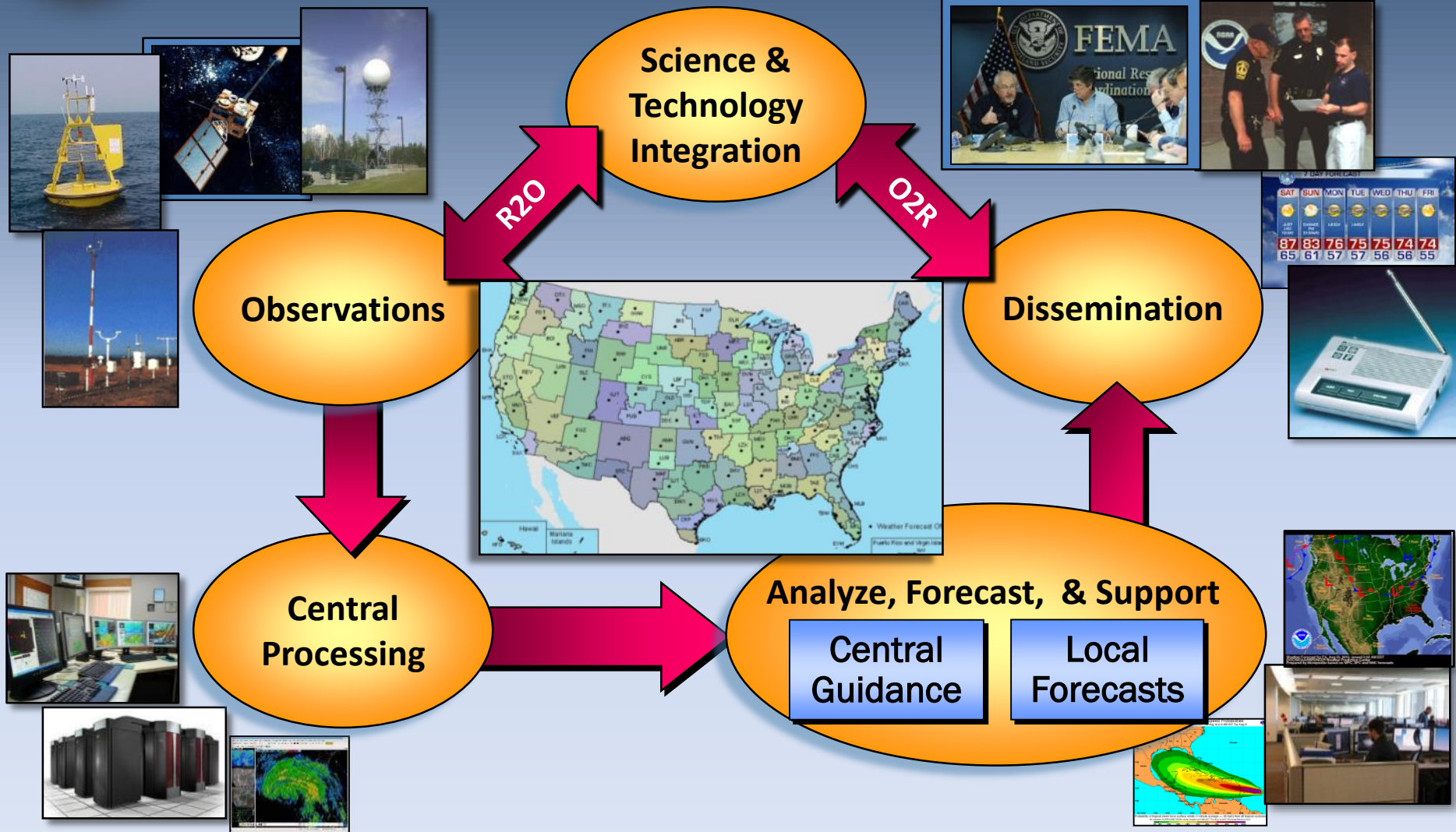
**Faith Borden**  
**Meteorologist**

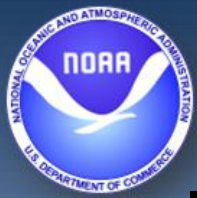
U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Weather Service – Nashville, TN



# National Weather Service Operations

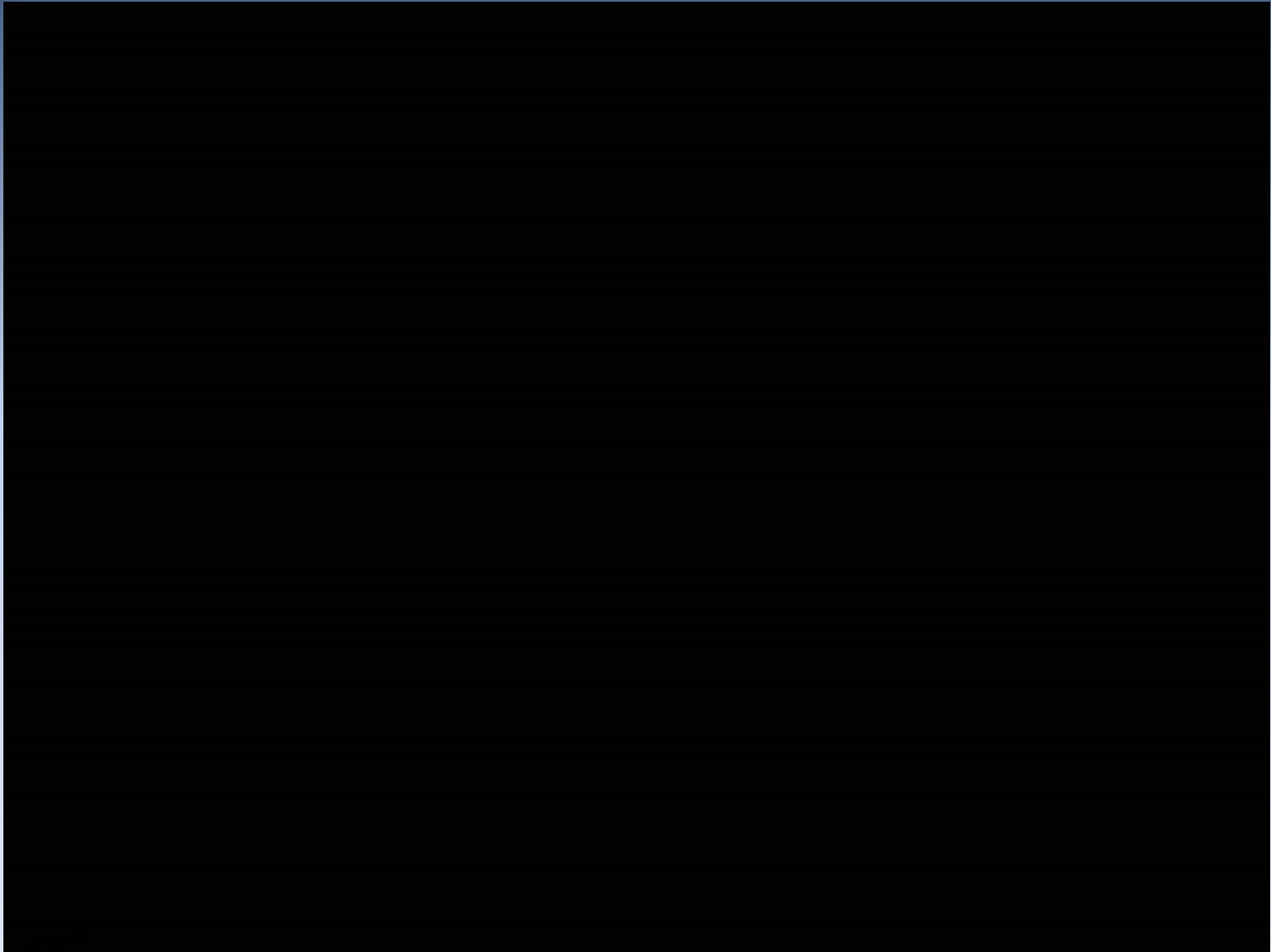
*mission: protect life and property*





# The NWS

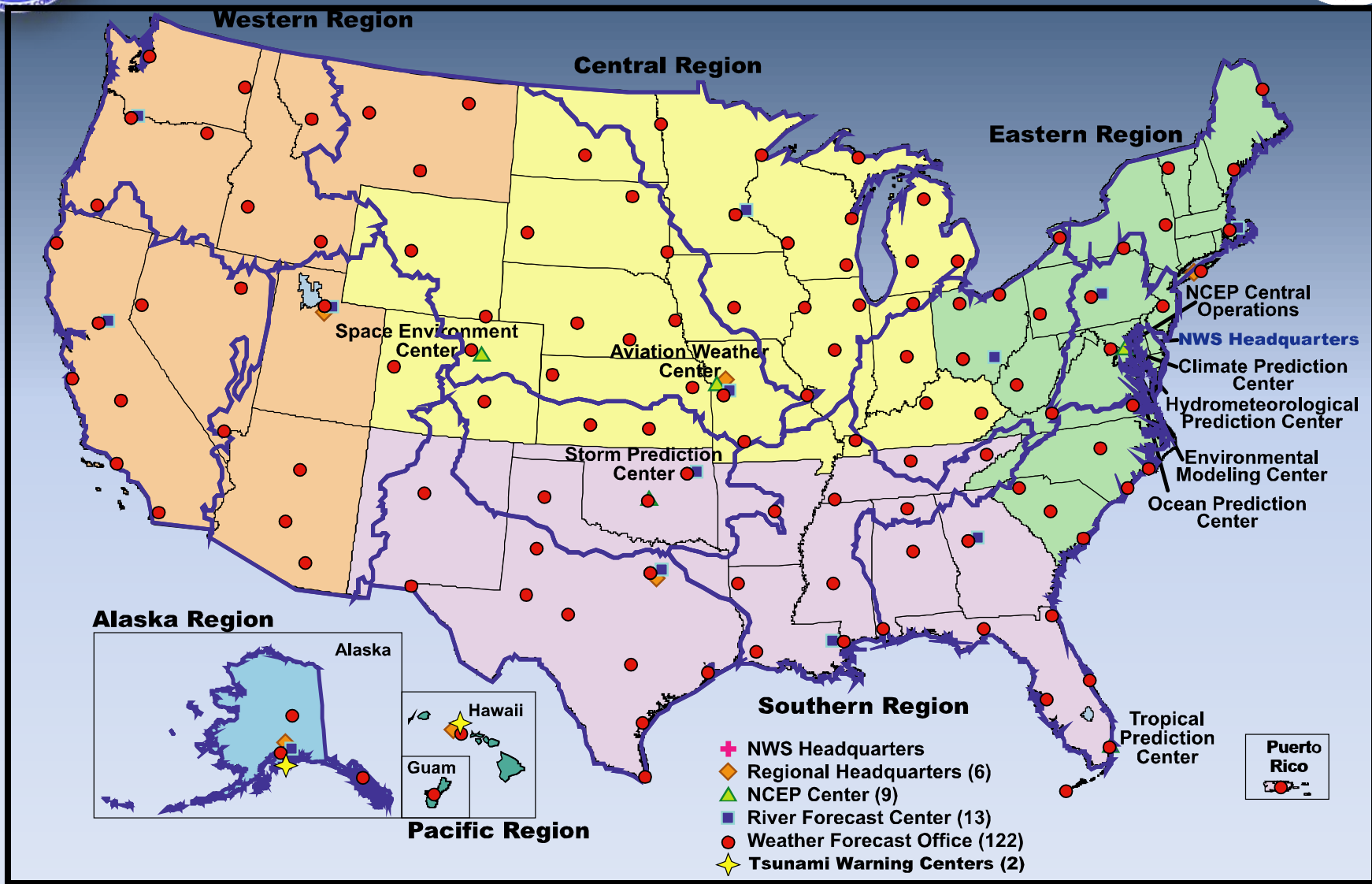
<https://youtu.be/V2yR7l14Kuw>





# NWS Offices

## 122 Weather Forecast Offices (WFOs)







# WHO ARE WE?

**U.S. Government**

**Dept. of Commerce**

**NOAA**

**National  
Weather  
Service**

**NESDIS**

**NOAA  
Research**

**Ocean  
Service**

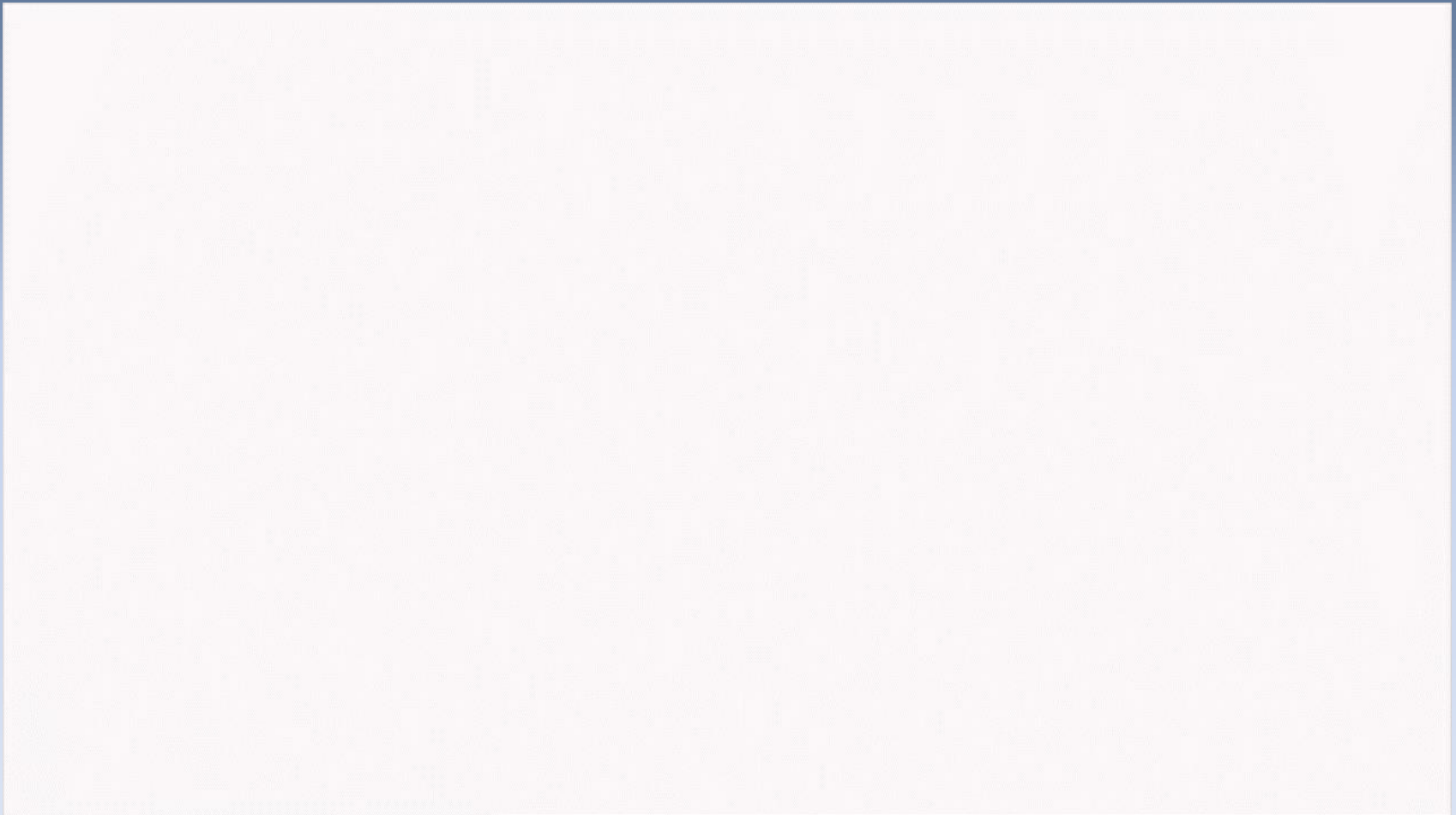
**Fisheries**

**Marine and  
Aviation  
Operations**



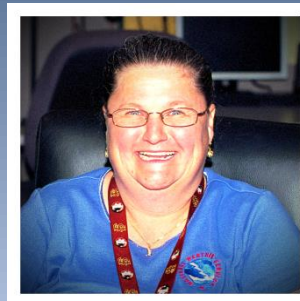
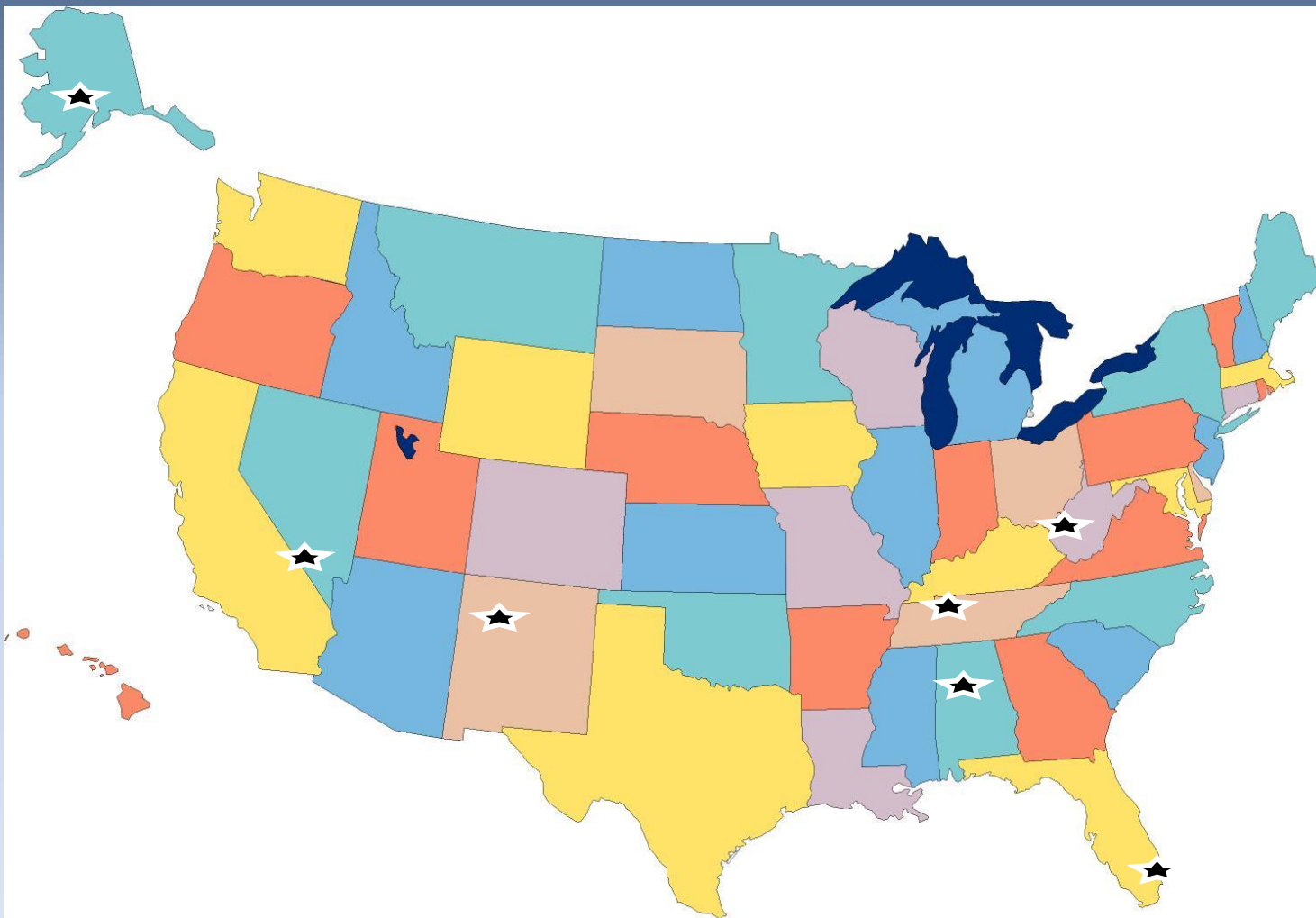
# Turn Around Don't Drown

<https://youtu.be/ZbzDo5A5yH0>





# YOUR TOUR GUIDE



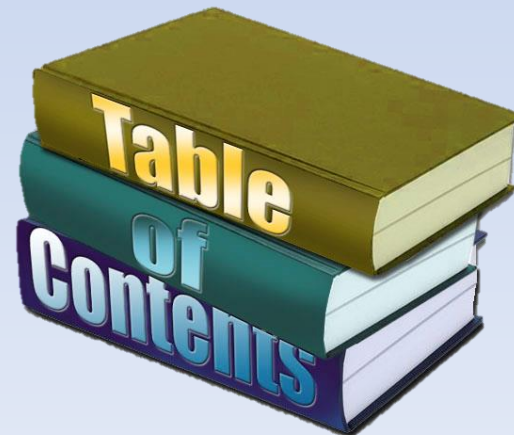
Locations I have  
Worked

- Anchorage, AK
- Albuquerque, NM
- Miami, FL
- Birmingham, AL
- Las Vegas, NV
- Charleston, WV
- Nashville, TN



# Content

- Causes – River Flooding vs Flash Flooding
- Case Studies
- What Goes Through A Forecaster's Mind
- NWS Flood Products – what does it all mean?
- CoCoRaHS





# (River) Flood vs. Flash Flood

- River Flood – over a longer period of time
  - Typically have time to prepare and evacuate
- Flash flood – happens very quickly with a rapid rise of water
  - Generally a few minutes to 6 hours or less
  - It doesn't even need to be raining over the direct area to get flash flooding





# Types of Flooding

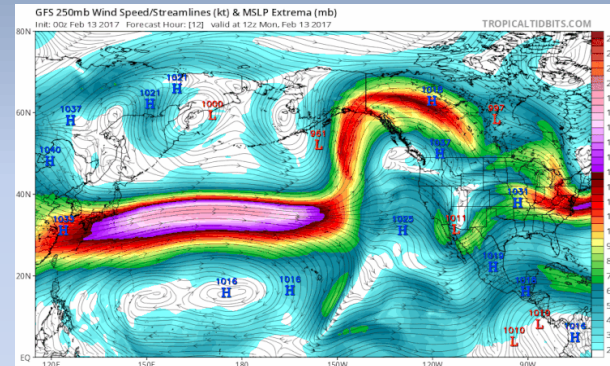
<https://youtu.be/8icc9jR6uWo>





# Types of River Flooding

- Heavy rain over a long period of time
  - **Atmospheric River** (becoming a big jargon word)
    - i.e. Pineapple Express
  - Overflowing Rivers
  - **Dam Break** (typically considered flash flooding)
  - Snow Melt
  - Storm Surge (strong winds from hurricanes)





# Flash Flooding

<https://youtu.be/OilAJM78ZN4>

THE FLASH FLOOD

A 3D SIMULATION BY;  
alicknyangulu@gmail.com

A 2013 Visualisation.  
ALL RIGHTS RESERVED.





# Debris Flow From Flash Flooding

<https://youtu.be/Pvx5VMasOJQ>





# Question

- What is an example of River Flooding?
- A. Typical summertime thunderstorm over a poor drainage area
- B. Atmospheric River
- C. Runoff from a mountainous area
- D. Dam break







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# Quiz Question

- What is an example of Flash Flooding?
- A. Dam break
- B. River out of its bank because it has been raining for such a long period of time and the water has nowhere else to go
- C. Snow melt/ice jam
- D. Storm surge from a tropical system





# Quiz Question

- What is an example of Flash Flooding?
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# Case Study – November 6-7, 2017

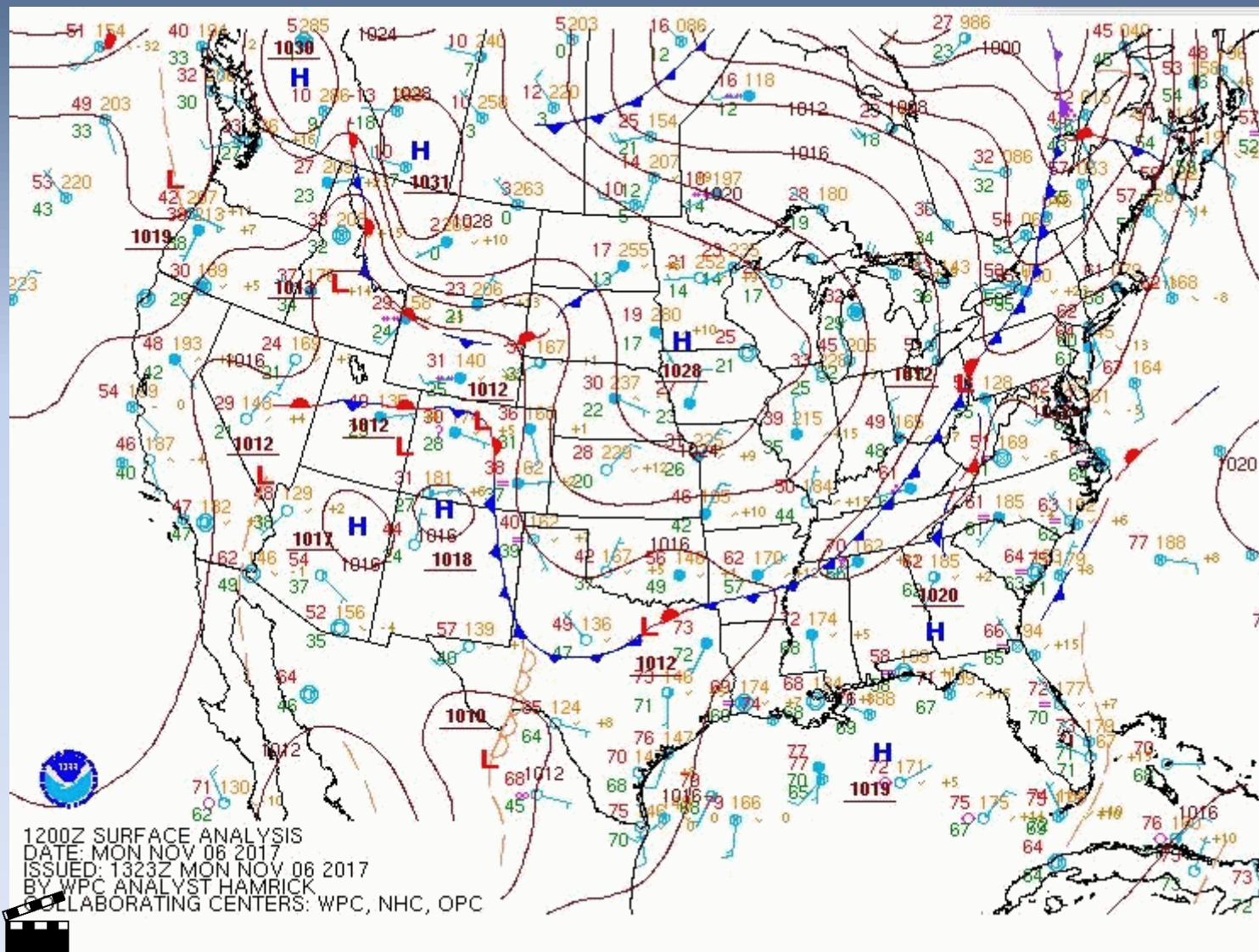
## Walterhill, TN (Rutherford County)

- Background Information:
  - Cold front moved across Middle TN during the day on Monday November 6<sup>th</sup>, stalling across northern Alabama in the evening
    - This cold front “lifted” back north as a warm front overnight on Tuesday November 7<sup>th</sup>
  - Several rounds of thunderstorms “trained” along and north of the front
    - Over 6 inches of rain fell in some areas
      - Resulted in widespread flash flooding and river flooding from Humphreys County eastward across southern Nashville metro area to Cumberland County
        - » Some the worst flooding affected parts of De Kalb County including Alexandria, Liberty, Temperance Hall, and Dowelltown areas



# Animated Surface Weather Map

## Nov 6<sup>th</sup> 6 am to Nov 7<sup>th</sup> 3 pm







# Radar Imagery

## Nov 7<sup>th</sup> 7 pm to 1 am

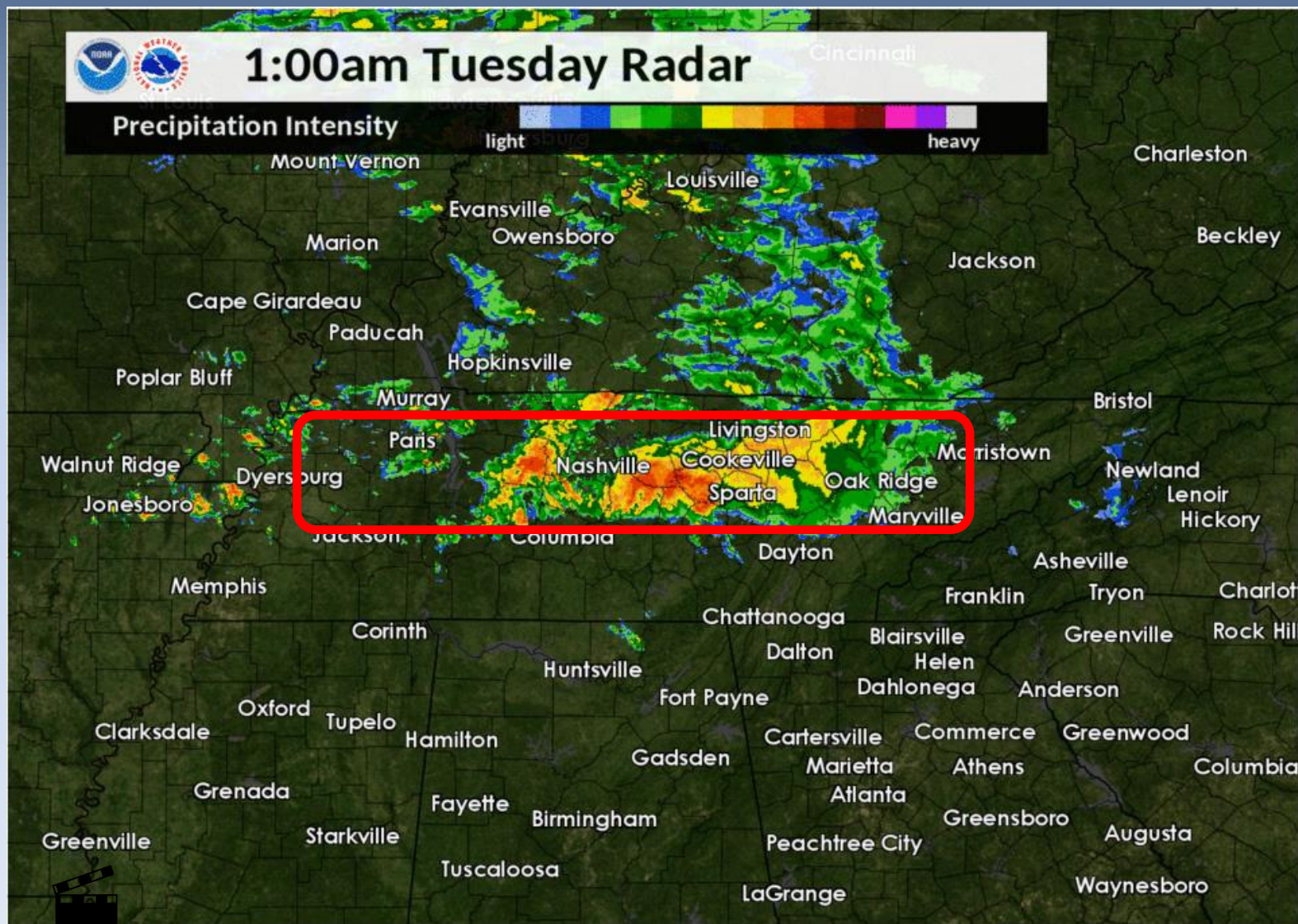






# Radar Imagery

## Nov 7<sup>th</sup> 1 am to 7 am

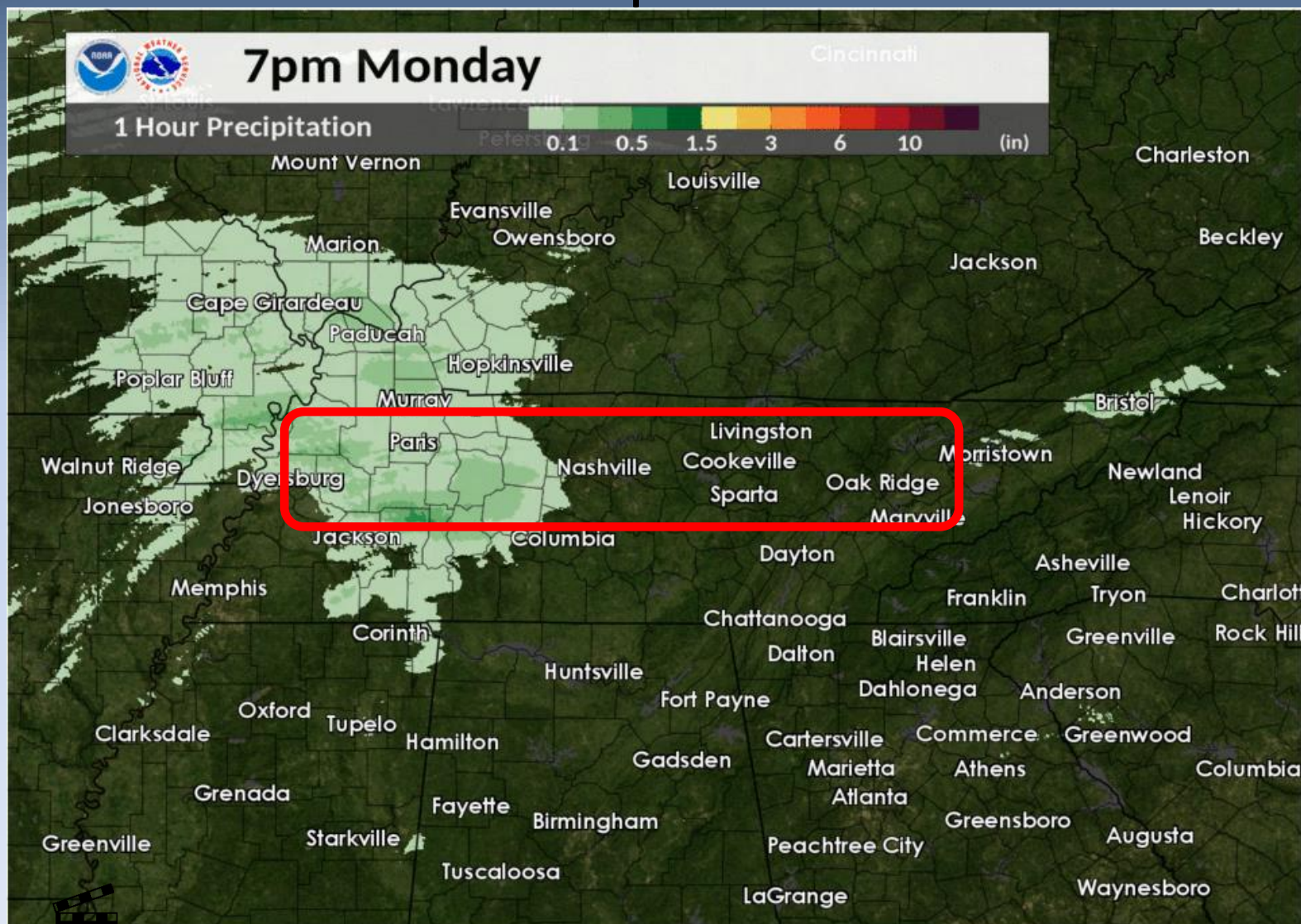






# Quantitative Precipitation

Nov 7<sup>th</sup> 7 pm to 1 am



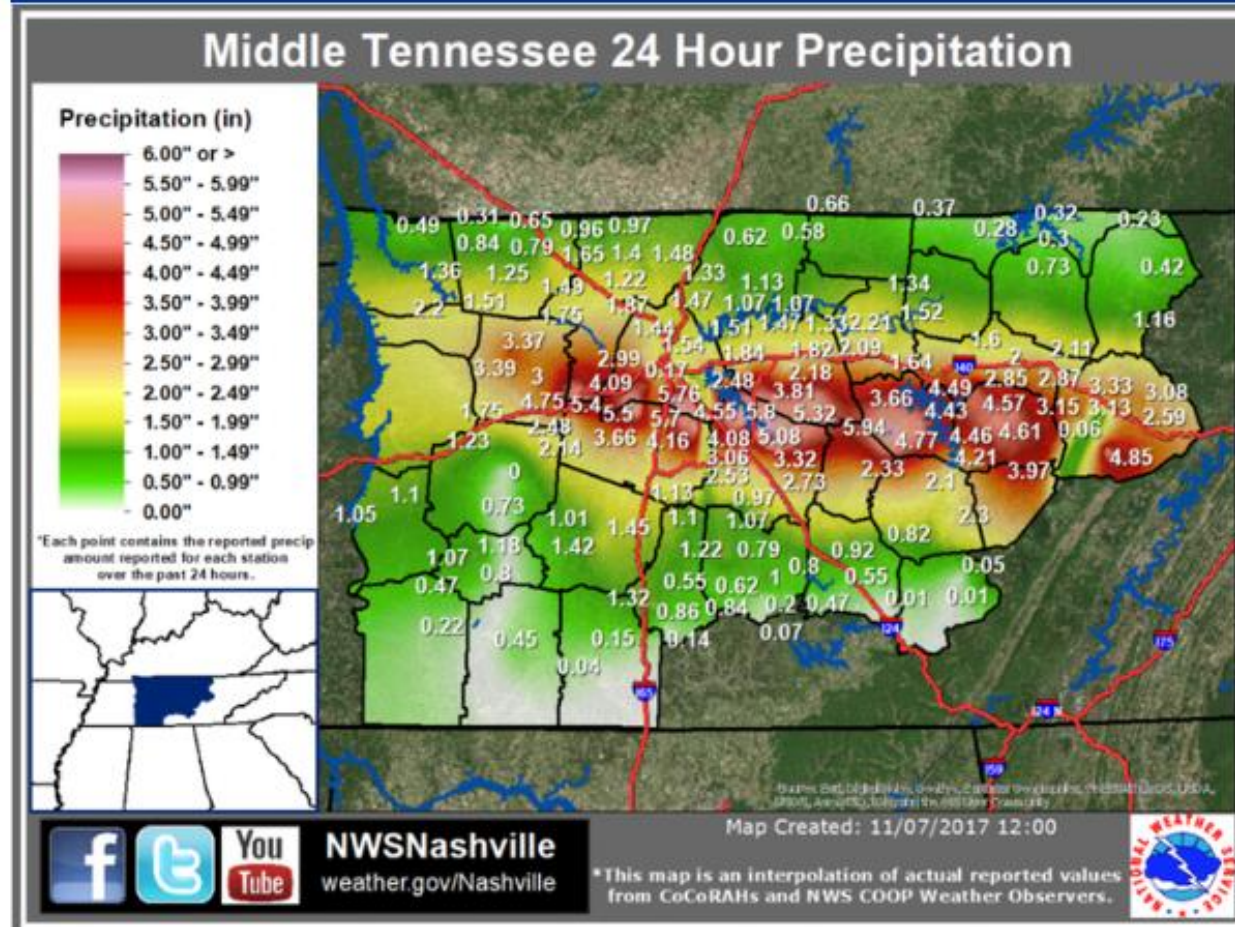






# 24 Hour Rainfall Totals

## 24 Hour Rainfall Totals







# Rainfall Amounts

697  
NOUS44 KOHX 092120  
PNSOHX  
TNZ005>011-023>034-056>066-075-077>080-093>095-100920-

Public Information Statement  
National Weather Service Nashville TN  
320 PM CST Thu Nov 9 2017

...72 Hour Rainfall Totals...

Location	Amount	Time/Date	Provider
Statesville	6.05 in	0130 PM 11/09	GOES
4 WSW Smithville	6.03 in	0700 AM 11/09	COCORAHS
1 SW Kingston Springs	5.44 in	0700 AM 11/09	COCORAHS
2 ESE Smyrna	5.20 in	0400 AM 11/09	COCORAHS
2 W Walterhill	5.11 in	0700 AM 11/09	COCORAHS
6 S Crossville	4.96 in	0700 AM 11/09	COCORAHS
Kingston Springs	4.90 in	0430 AM 11/09	COCORAHS
3 SE Walterhill	4.82 in	0200 PM 11/09	HADS
Smithville 2se	4.80 in	0700 AM 11/09	COOP
1 WSW Sparta	4.79 in	0800 AM 11/09	COCORAHS
2 WNW Sparta	4.68 in	0600 AM 11/09	COCORAHS
Sparta	4.64 in	0800 AM 11/09	COOP
Big Lick	4.61 in	0200 PM 11/09	GOES
3 NNW La Vergne	4.57 in	0500 AM 11/09	COCORAHS
1 ENE Burns	4.48 in	0206 PM 11/09	RAWS
1 ENE Oak Hill	4.22 in	0700 AM 11/09	COCORAHS
3 ENE Doyle	4.22 in	0700 AM 11/09	COCORAHS
1 ENE Fairview	4.14 in	0630 AM 11/09	COCORAHS
3 ESE Doyle	4.08 in	0700 AM 11/09	COCORAHS
Sparta	4.06 in	0215 PM 11/09	GOES
3 NW Murfreesboro	4.02 in	0230 PM 11/09	GOES

Observations are collected from a variety of sources with varying equipment and exposures. We thank all volunteer weather observers for their dedication. Not all data listed are considered official.

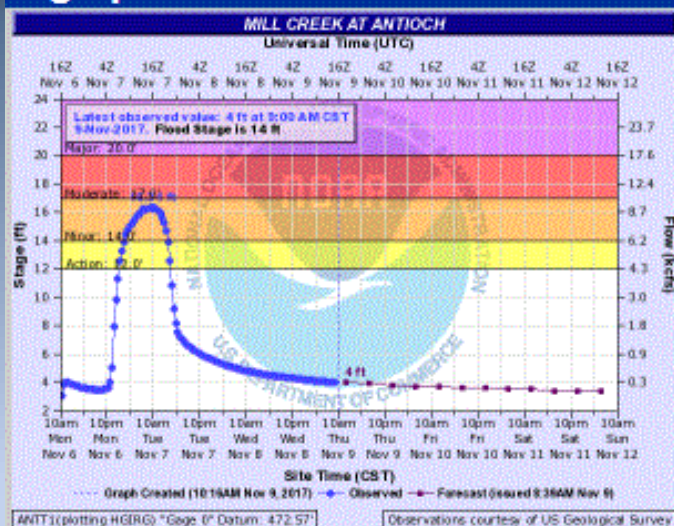
\$\$

Shamburger

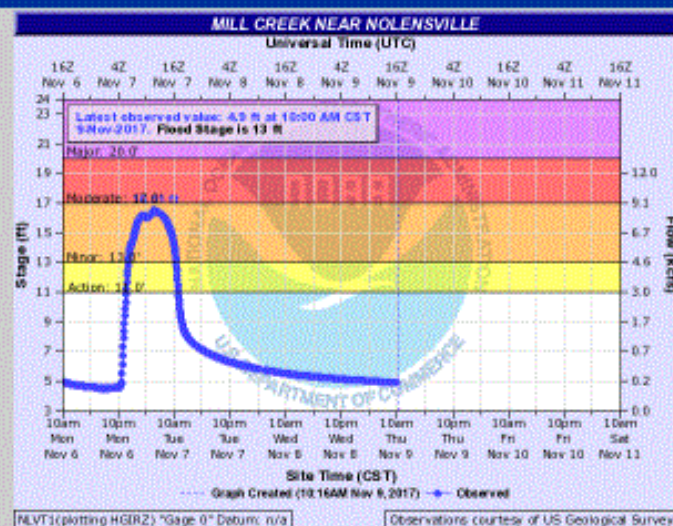


# AHPS Hydrographs

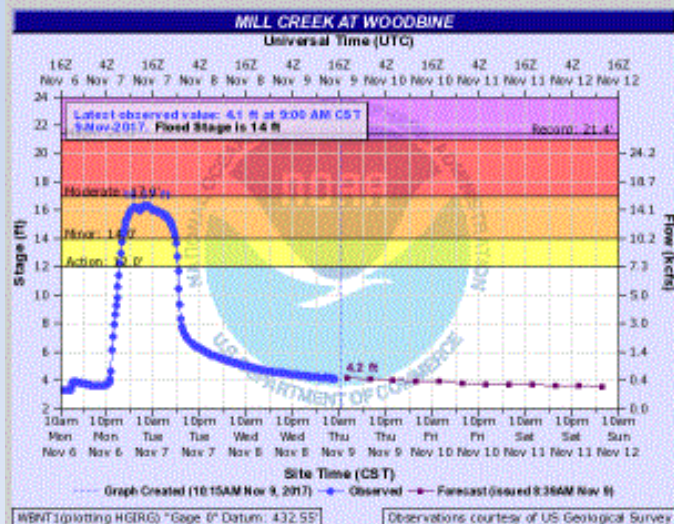
<https://water.weather.gov/ahps/forecasts.php>



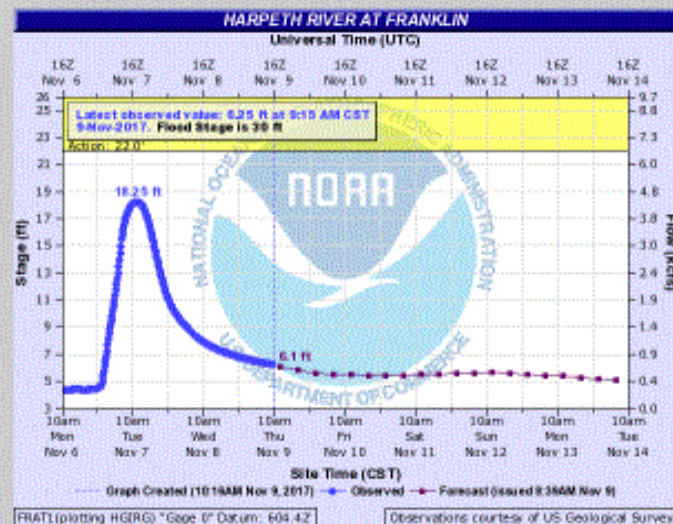
*Mill Creek at Antioch*



*Mill Creek near Nolensville*



*Mill Creek at Woodbine*



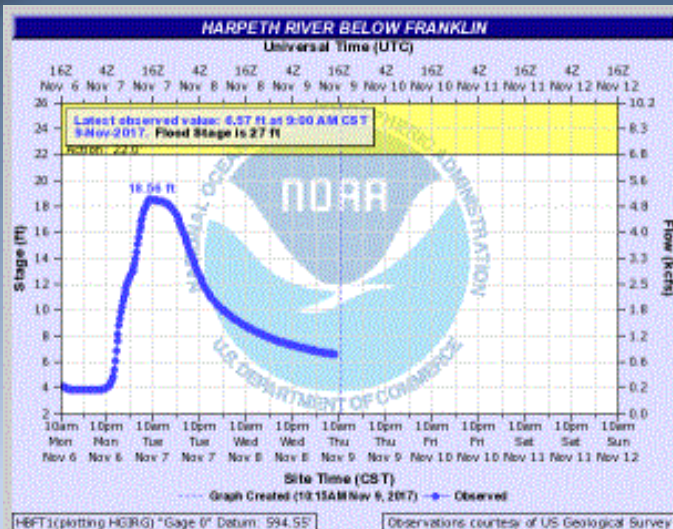
*Harpeth River at Franklin*



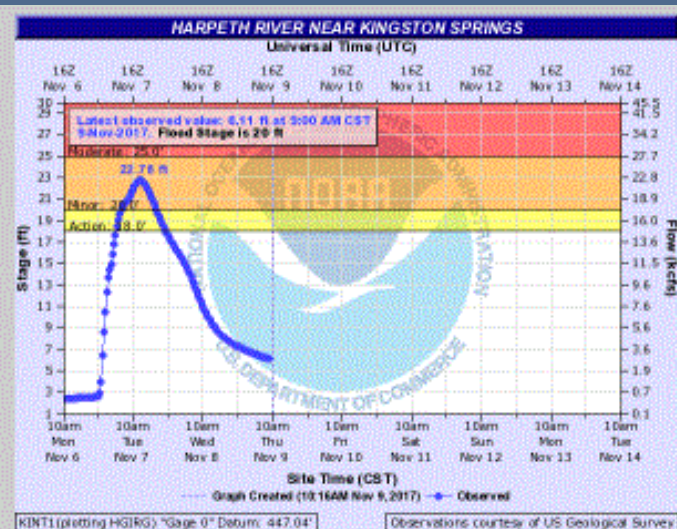


# AHPS Hydrographs

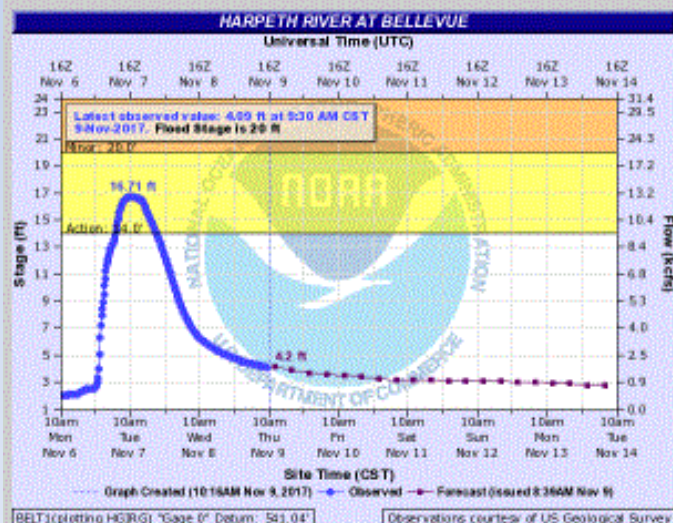
<https://water.weather.gov/ahps2/forecasts.php?wfo=ohx>



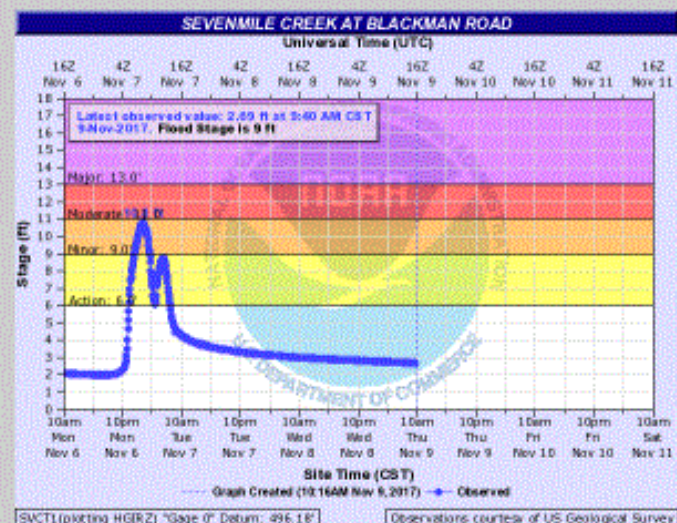
*Harpeth River below Franklin*



*Harpeth River near Kingston Springs*



*Harpeth River at Bellevue*

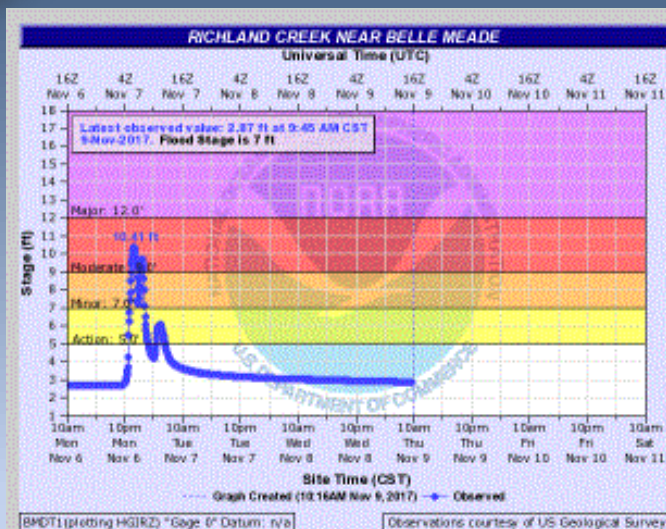
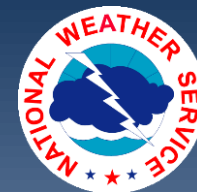


*Sevenmile Creek at Blackman Road*

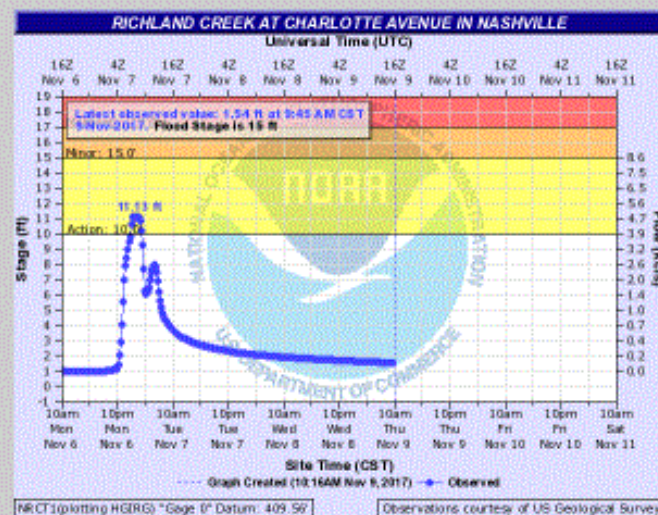




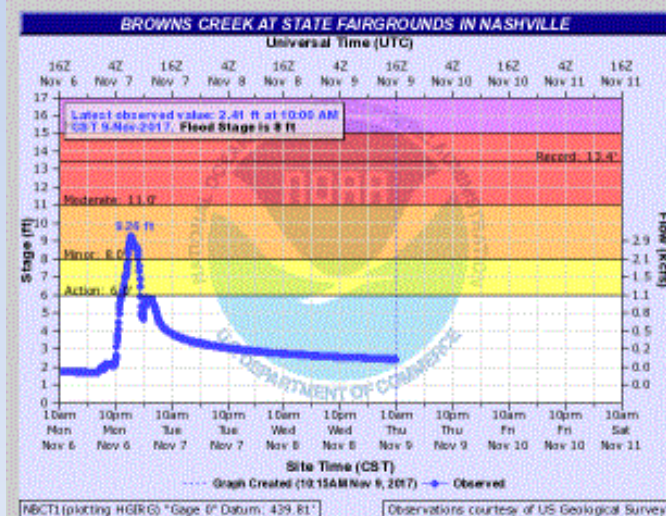
# AHPS Hydrographs



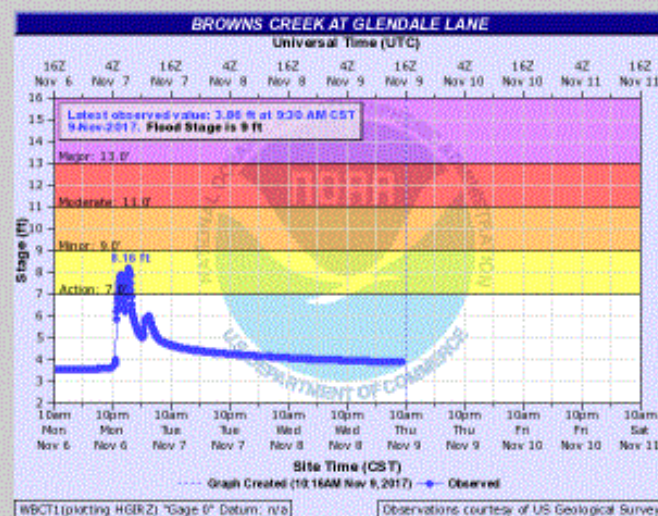
*Richland Creek near Belle Meade*



*Richland Creek at Charlotte Avenue in Nashville*



*Browns Creek at State Fairgrounds in Nashville*

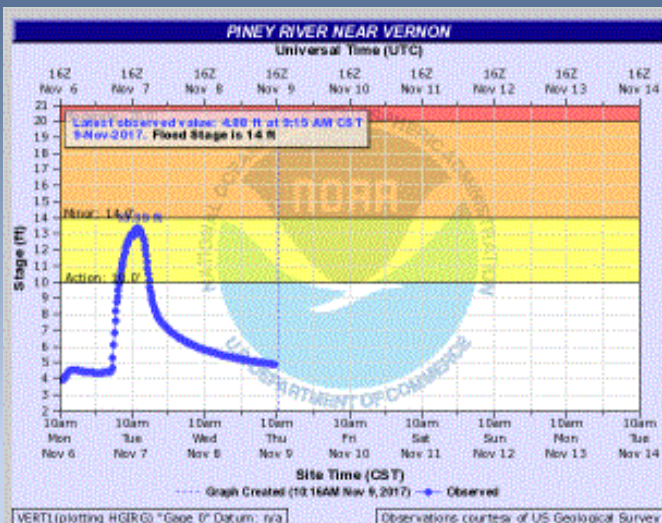
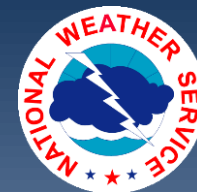


*Browns Creek at Glendale Lane*

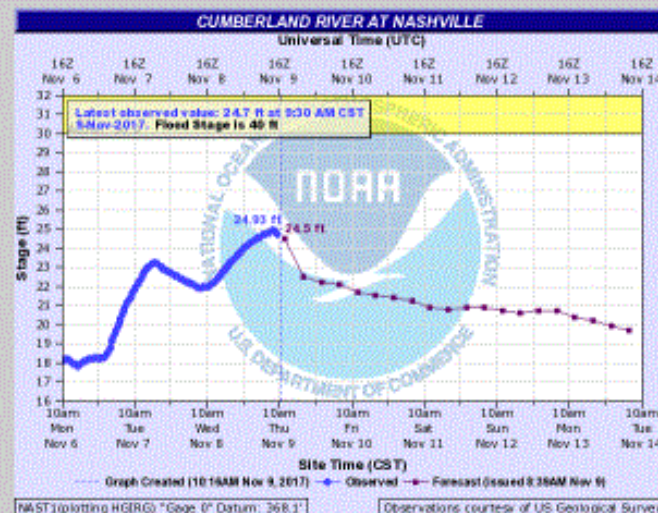




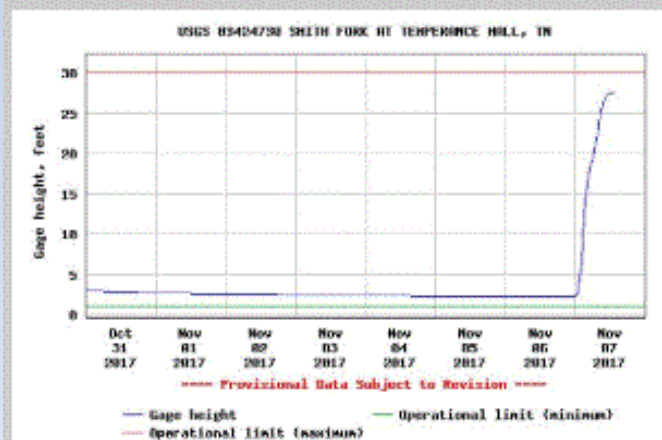
# AHPS Hydrographs



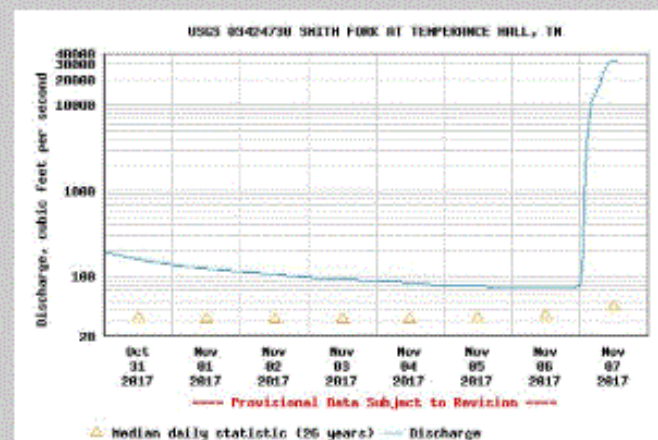
**Piney River near Vernon**



**Cumberland River at Nashville**



**USGS Smith Fork at Temperance Hall**



**USGS Smith Fork at Temperance Hall Discharge Rate**





# Pictures



**Auburntown, TN (De Kalb County)**  
Photo by Gennie Morgan



**Winding Hills Lane in Gordonsville, TN (Smith County)**  
Photo by Gina Johnson



**Cherry Lane in Murfreesboro, TN (Rutherford County)**  
Photo by @olegunnerbryan



**Antioch, TN (Davidson County)**  
Photo by @chromaticsocks



**Waverly Road north of Waverly, TN (Humphreys County)**



**La Vergne, TN (Rutherford County)**





# Pictures



*Nevada Drive in Smyrna, TN (Rutherford County)  
Photo by Lynn Mullis-Timmons*



*Brittain Lane in Nolensville, TN (Williamson County)  
Photo by Sara Weiland*



*Smith Fork Creek in Temperance Hall, TN (De Kalb County)  
Photo by David Walker*



*Highway 264 in Temperance Hall, TN (De Kalb County)  
Photo by @Rkw3838*





# Pictures



*Walterhill, TN (Rutherford County)  
Photo by Kristen Shaw*



*Powells Chapel Road in Walterhill, TN (Rutherford County)  
Photo by Abbie Davis*



*near Sparta, TN (White County)  
Photo by @10uhhseegirl*



*Stones River in Woodbury, TN (Cannon County)  
Photo by Kimberly Smithson*



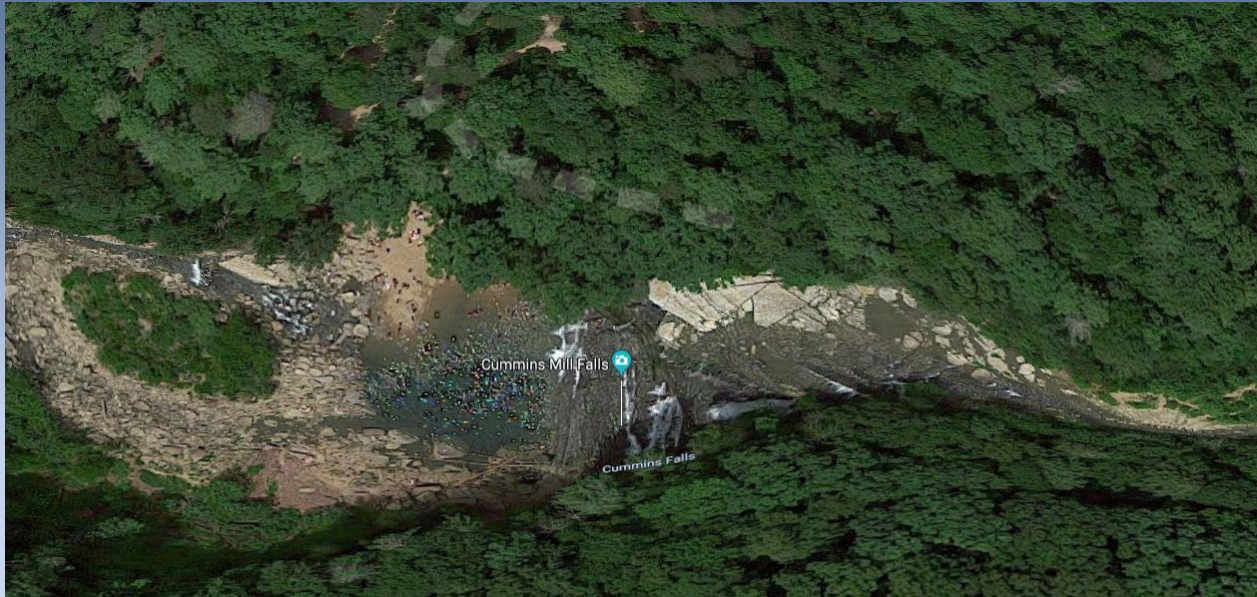
# Conclusion

- Training storms can cause a lot of rainfall over a period of time.
- Extremely high rainfall amounts are possible!
- When something like this happens overnight it can be especially dangerous.
- If you live in a flood prone area please make sure you have multiple ways to get warnings!
- It's **important** to stay away from creeks and streams due to rapid rises.





# Cummins Falls State Park

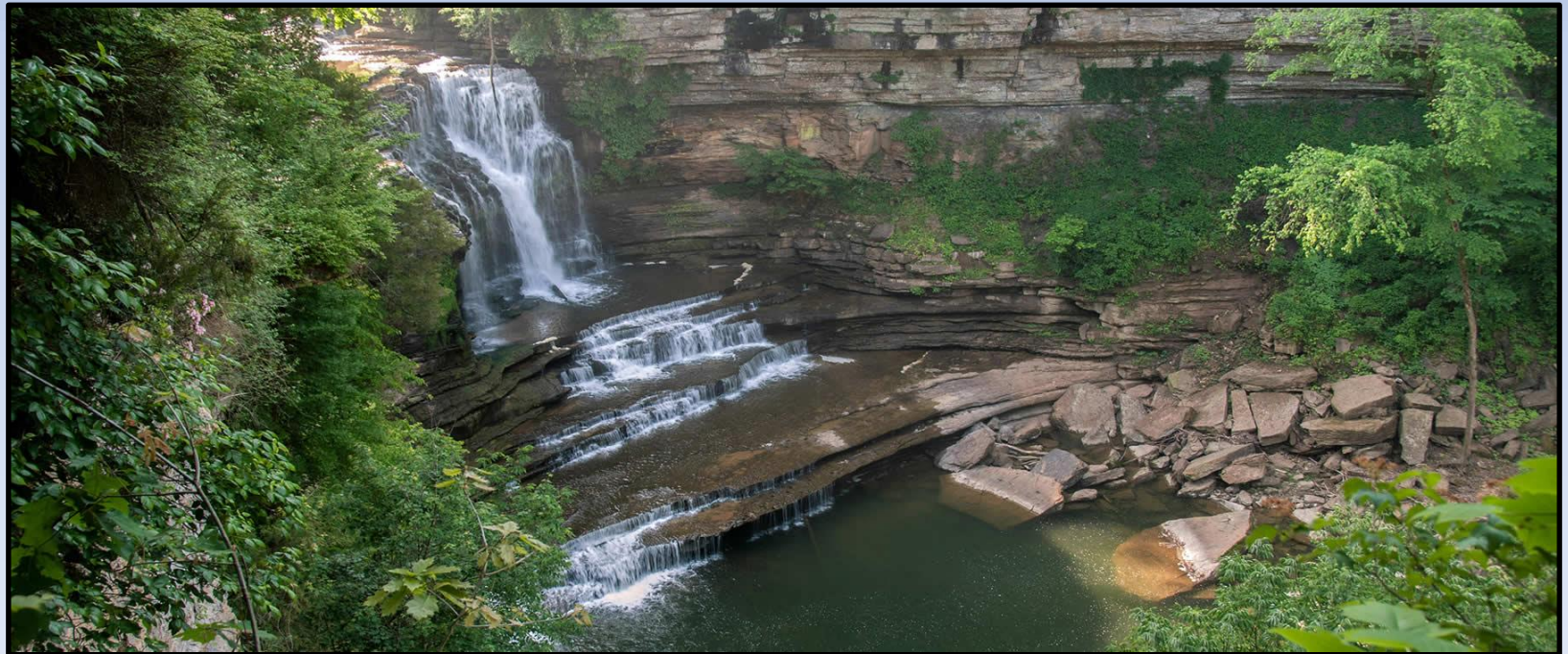


- This event occurred in July 2018
- Like other events at this location, the park saw impacts from the rain even though the park is well away from where the heaviest rain fell



# Cummins Falls State Park

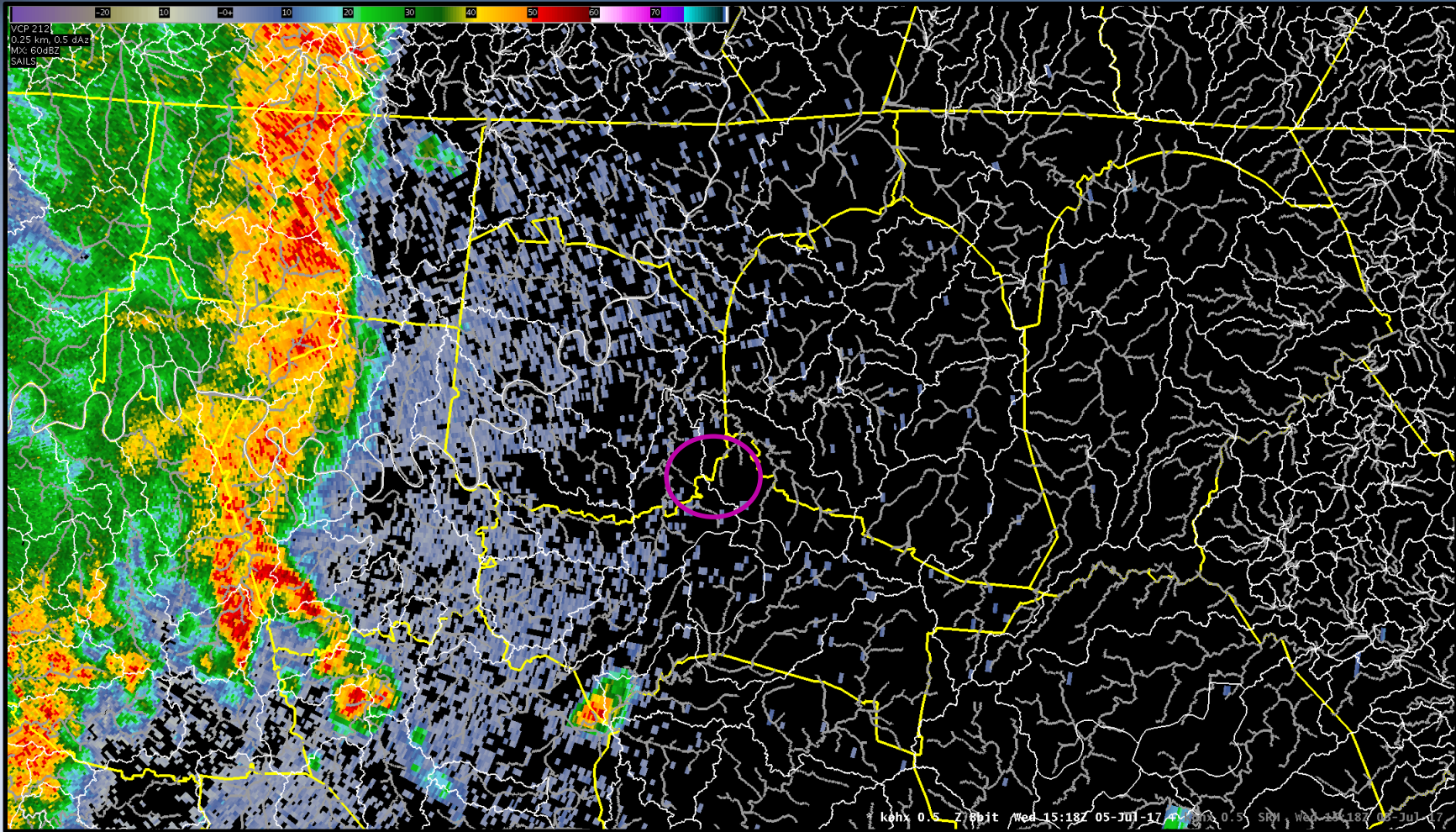
- Water quickly overwhelmed the falls, and numerous people had to be rescued
- One fatality did occur from the flooding, with another fatality occurring later







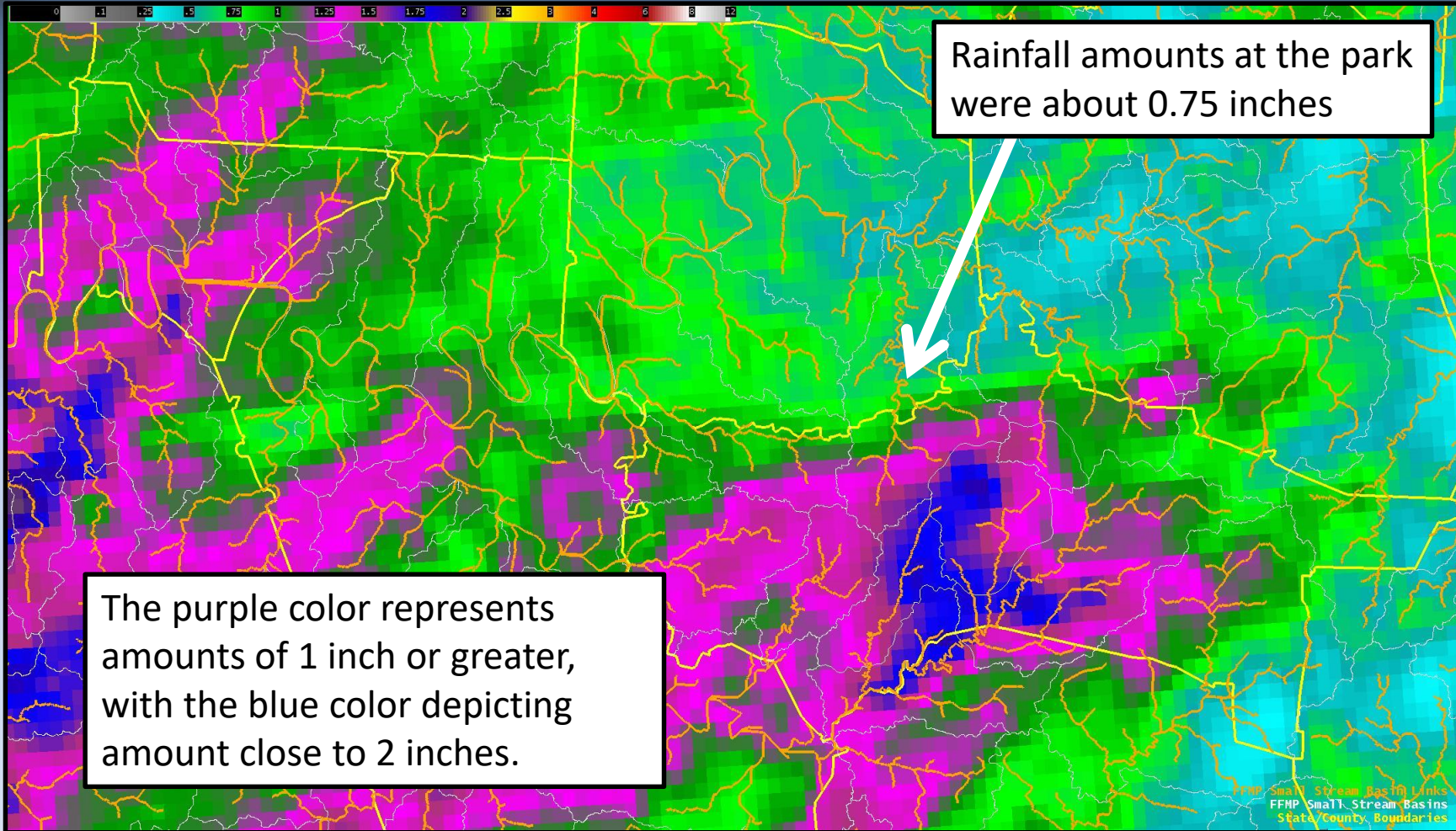
# Cummins Falls State Park







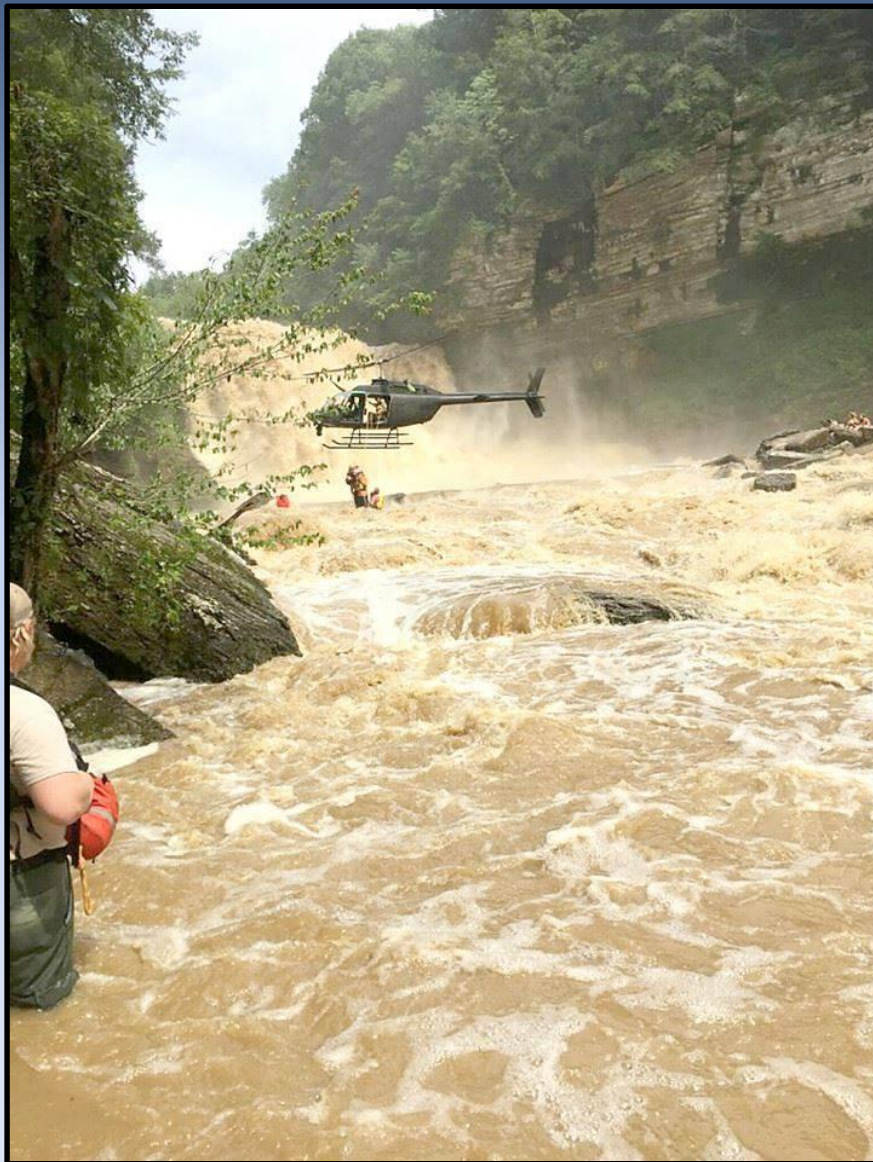
# Cummins Falls State Park







# Cummins Falls State Park







# July 13<sup>th</sup> – 3:00pm





July 13<sup>th</sup> – 3:51pm







July 13<sup>th</sup> – 3:52pm





July 13<sup>th</sup> – 3:53pm







July 13<sup>th</sup> – 3:54pm







July 13<sup>th</sup> – 3:55pm







July 13<sup>th</sup> – 4:30pm







# Cummins Falls Video



<https://youtu.be/MOlGhe1np3A>



Greenways are linear parks, cultural opportunities, and a recreational opportunity in a crucial role in protecting us of flooding. And for every greenway trail, it means an environmental health.

[illegible][illegible]

All paid parts are free and will continue; please observe the following rules:  
 • Maximum speed on trails is 10 mph  
 • Stay to the right and on the left  
 • Kicker pads on horses not longer than six feet  
 • No dogs and no alcohol  
 • Cows are usually started when presenting ("Oh, your hull")  
 • Stay on clearing trails and  
 • That's all of it, remember!

We're excited to  
 thank you and  
 please, we're  
 looking forward  
 to seeing you  
 soon!

We're excited to  
 thank you and  
 please, we're  
 looking forward  
 to seeing you  
 soon!

only unless otherwise noted  
 strictly during heavy rain

**Important Numbers:**

Call 615-666-3428 for  
Rapid Response assistance.  
or 615-611 for other inquiries.  
For Metro Parks Offices,  
call 615-562-8400

**Important Links:**

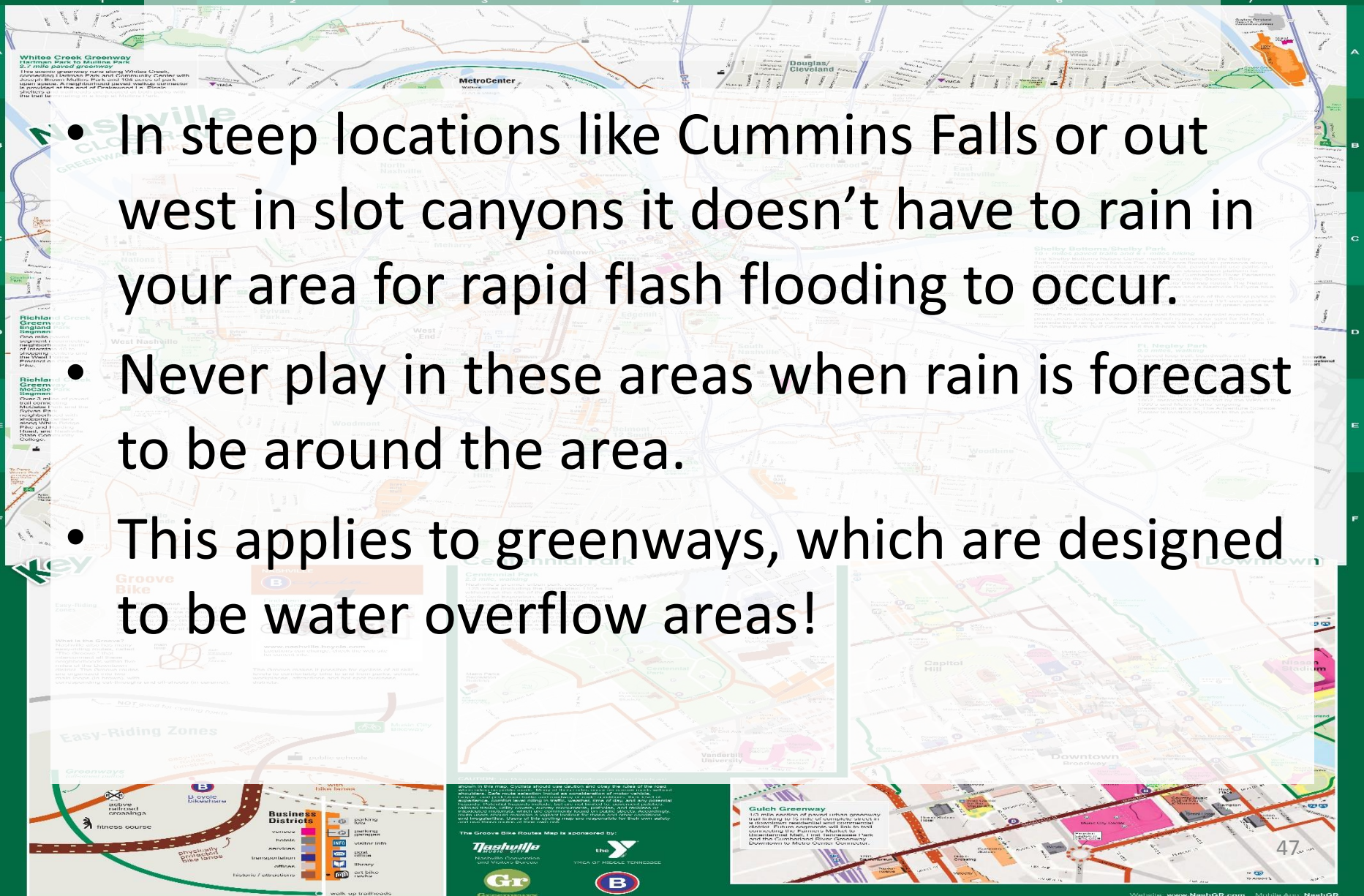
Website:  
[www.greenwaysforaashville.org](http://www.greenwaysforaashville.org)  
Metro Parks App: [www.NashGP.org](http://www.NashGP.org)

For updates on the ever-growing  
list of greenways, visit:  
[www.nashville.gov/greenways](http://www.nashville.gov/greenways)

Metro Parks Homepage:  
[www.metrovillage.gov/parks](http://www.metrovillage.gov/parks)

# Conclusion

- In steep locations like Cummins Falls or out west in slot canyons it doesn't have to rain in your area for rapid flash flooding to occur.
- Never play in these areas when rain is forecast to be around the area.
- This applies to greenways, which are designed to be water overflow areas!







# So What's Going through a Forecaster's Mind?



## Flash Flood Warning Operations Methodology

Familiarize with the environment

Familiarize with antecedent soil conditions and topography

Choose your optimal precip source

Analyze heavy rainfall and streamflow in radar, FFMP, and FLASH

Issue FFWs with proper criteria and routinely reassess



## Long, skinny CAPE

- ## Moist vertical profile

- Above average PWs**

- ## Deep Warm Cloud Layer

- **> 10 kft**

- Slow "LCL-EL (Cloud Layer)" wind

- **< 10 kt**

- ## Slow Corfidi Up/Down shear vectors

- **< 10 kt**

- ## Storm Motion

- With respect to forcing
- Training potential







## #2 Familiarize Yourself with Antecedent Soil Conditions and Topography



Look at 1-, 3-, 6-hr Flash Flood Guidance

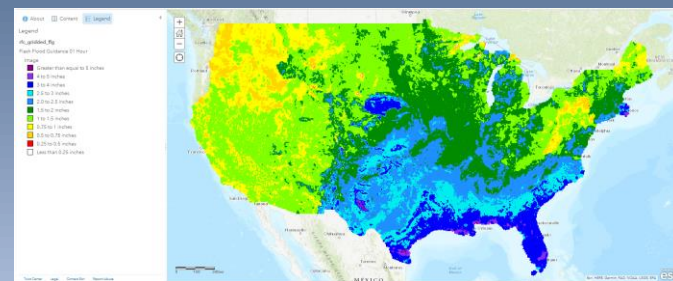
- **Low values = Less rain needed to cause flooding**

Consider topography

- **Flat, hilly, mountainous?**

Consider urban areas

- **Usually require less rainfall to flash flood**

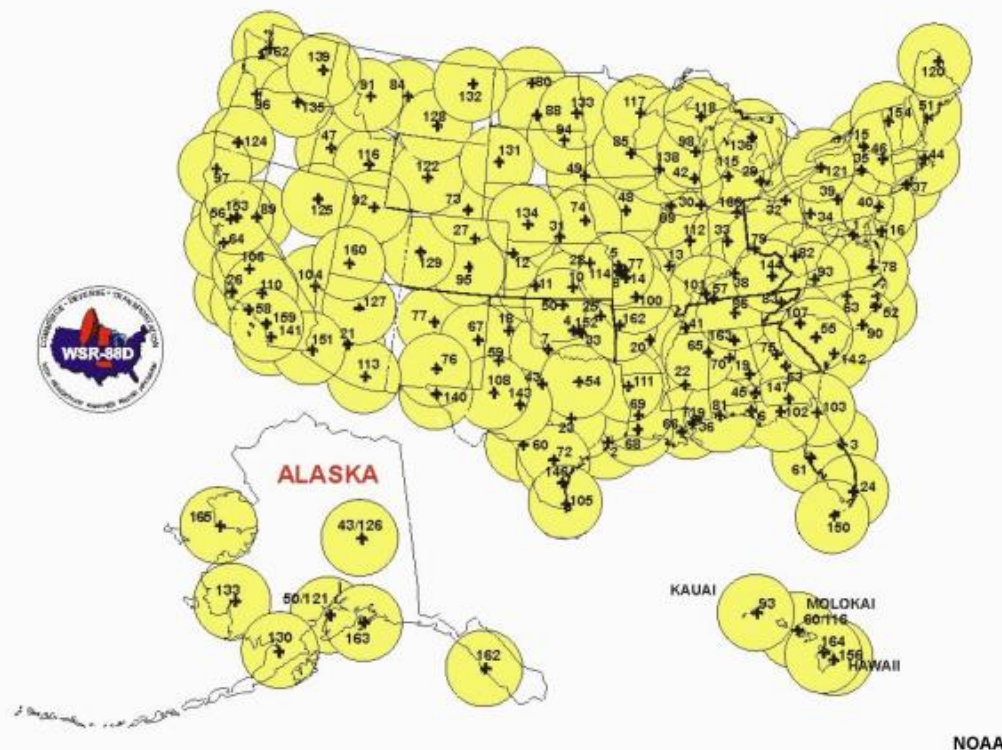




# #3 Choose Your Optimal Precip Source

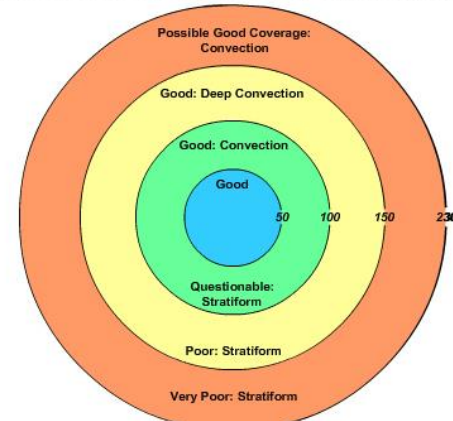
## Radar Coverage

Locations of WSR-88D Radars with the idealized 230-km Coverage Areas



Radar Coverage of Precipitation with Range (km)—Assuming No Beam Blocking

Radar Coverage of Precipitation with Range (km)—Assuming No Beam Blocking



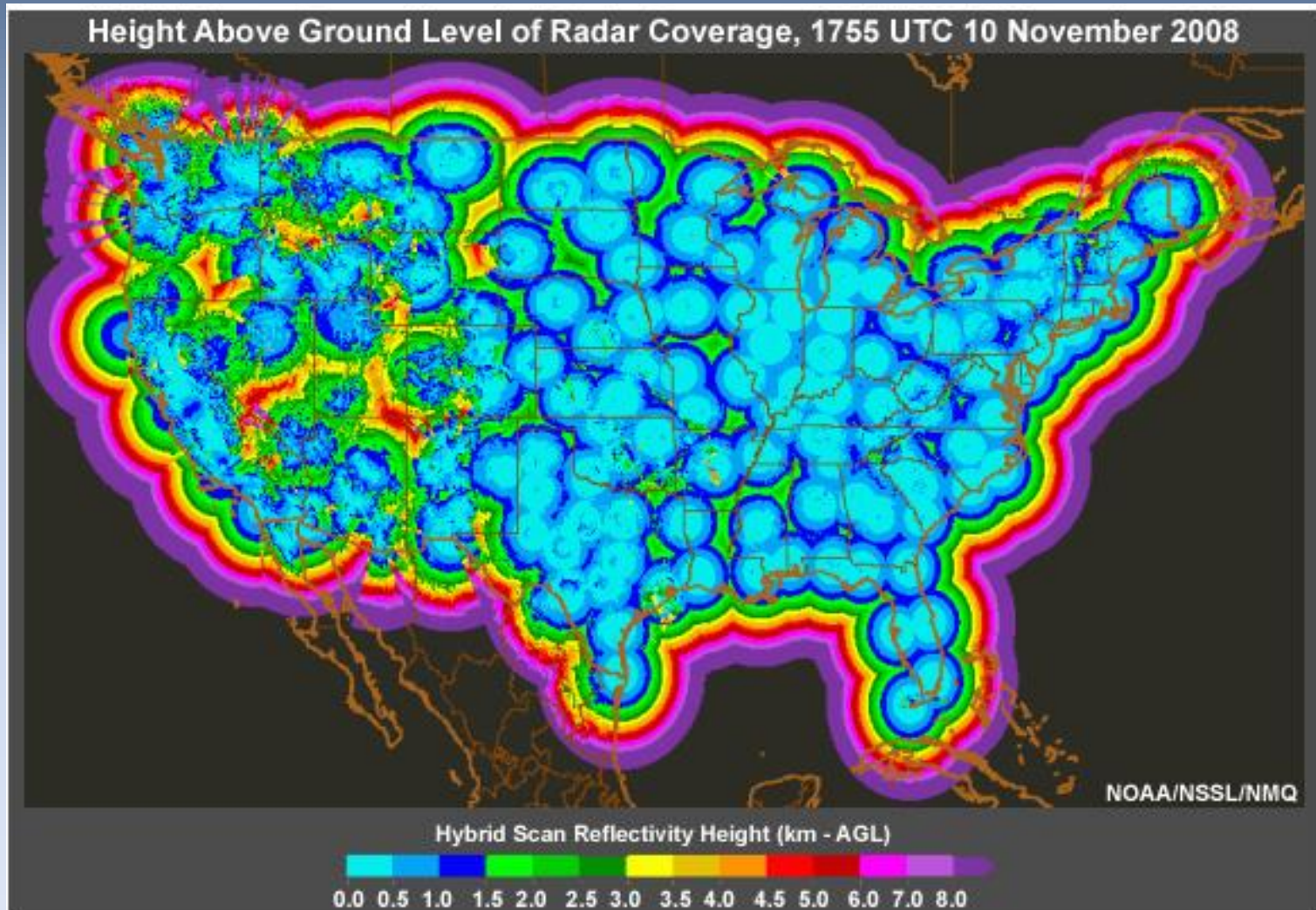
Note: Coverage is worse for snow, and in areas of rugged terrain

©The COMET Program



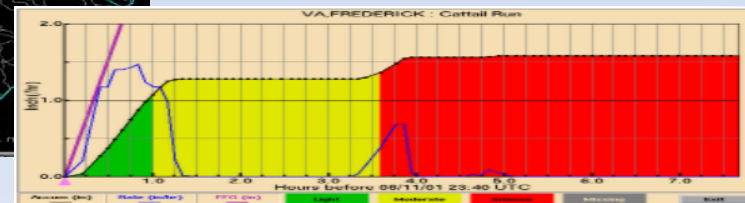
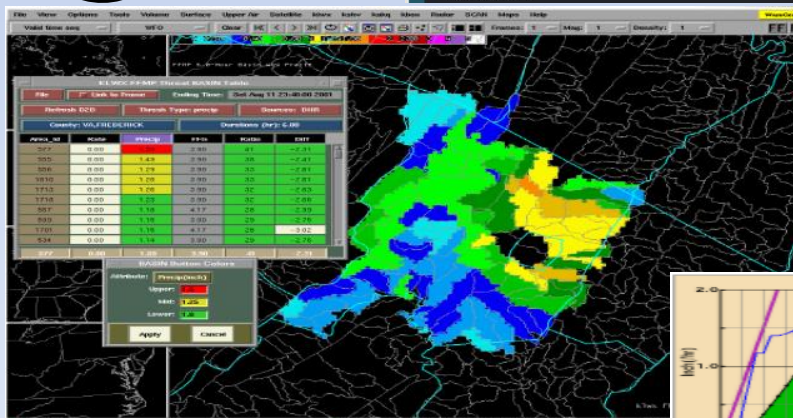
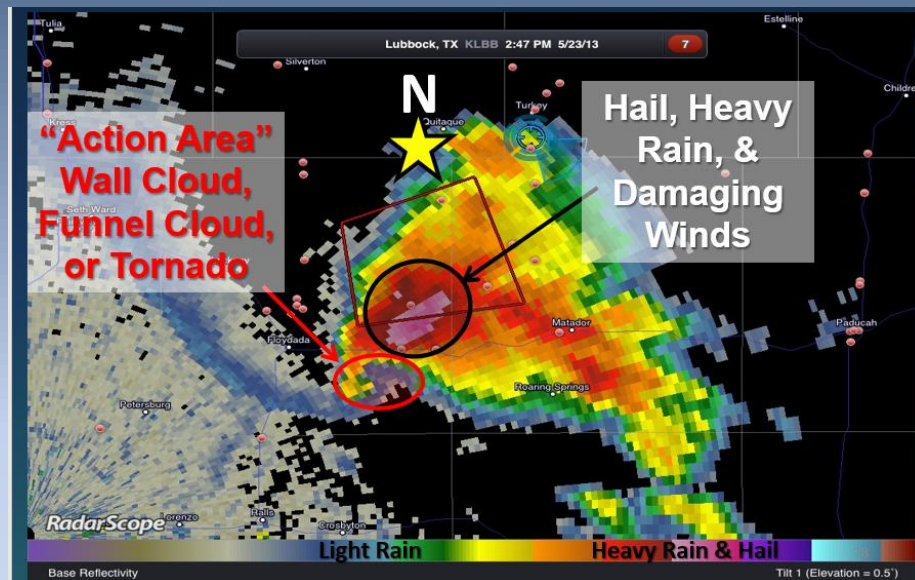
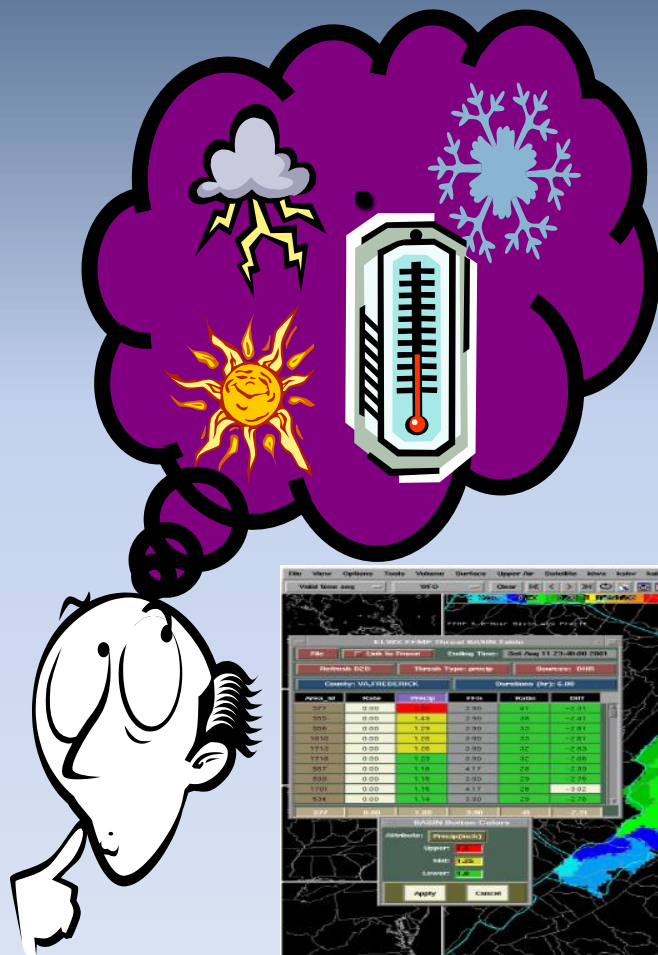


## #3 Choose Your Optimal Precip Source





# #4 Analyze Heavy Rainfall and Streamflow in Radar, FFMP and FLASH







# #5 Issue Your Warning

The screenshot shows the WarnGen software interface. On the left, there are several panels: 'Backup' with a 'JKL' button; 'Track type' with 'One Storm' and 'Line of Storms' options; 'Edit' with 'Box', 'Track', and 'Box and Track' options; 'Product type' with a list of warning types including 'Tornado Warning', 'Severe Thunderstorm Warning', 'Severe Weather Statement', 'Flood -or- Flash Flood Warning (FFW/FLW)', 'Areal Flood Advisory INITIAL ISSUANCE (FLS)', 'Flood Followup Statements (FFS/FLS)', 'Special Weather Statement', 'Short Term Forecast', and 'Other: Dam Break Flash Flood Warning'; 'Time range' with 'Duration: 30 min' and a time selection box; and 'Optional bullets' with a list of report types. At the bottom left are 'Create Text', 'Restart', and 'Close' buttons. The main window displays a radar map with a yellow warning box drawn over a storm system. A text box on the right lists the steps to issuing a warning.

**Steps to issuing warning:**

1. Choose warning type
2. Choose storm type (one storm or line of storms)
3. Track and draw the warning box
4. Set length of time for warning
5. Select basis for issuing warning
6. Select specific hazards expected and appropriate action statements
7. Create text and issue warning





# NWS Flood Products

**FLOODING AHEAD  
TURN AROUND  
DON'T DROWN**



**Never drive around  
barricades**

-  Most flood fatalities occur in vehicles
-  12 inches of water can sweep a car off the road



[weather.gov/flood](https://weather.gov/flood)



Don't underestimate the  
power of water!



6 inches of fast-moving  
water can knock over and  
carry away an adult.

12 inches of fast-moving water can  
carry away a small car.

18-24 inches of fast-moving  
water can carry away most  
large SUVs, vans and trucks.







# Hydrology VTEC Cheat Sheet

Hydrologic Product	Type	Required Application	Phenomena Code	Significance Code	Segmented
Areal Flood Watch	FFA	GFE/GHG	FA	A	Y
Flood Watch (Flash Flooding)	FFA	GFE/GHG	FF	A	Y
Forecast Point Flood Watch	FFA	RiverPro	FL	A	Y
Flash Flood Warning	FFW	WarnGen	FF	W	N
Flash Flood Statement	FFS	WarnGen	FF	W	Y
Forecast Point Flood Warning	FLW	RiverPro	FL	W	Y
Areal Flood Warning	FLW	WarnGen	FA	W	Y
Flood Statement to follow up a Forecast Point Flood Warning	FLS	RiverPro	FL	W	Y
Flood Statement to follow up an Areal Flood Warning	FLS	WarnGen	FA	W	Y
Flood Advisory for Urban and/or Small Stream Flooding	FLS	WarnGen	FA	Y	Y
Flood Advisory (General)	FLS	WarnGen	FA	Y	Y
Forecast Point Flood Advisory	FLS	RiverPro	FL	Y	Y
Hydrologic Outlook	ESF	GFE	None	None	N
Hydrologic Statement	RVS	RiverPro	None	None	N
Hydrologic Summary	RVA	RiverPro	None	None	N
River and Lake Forecast Product	RVD	RiverPro	None	None	N



# Watch



**Flood Watch** means  
be prepared:  
Flooding is possible



Check for forecast updates



Prepare to move to higher ground



Stay weather ready

[weather.gov/flood](https://weather.gov/flood)







# Warning



**Flood Warning** means  
take action!

Flooding is expected





-  Move to higher ground immediately
-  Use extra caution if driving
-  Check forecast updates
-  Stay weather ready

Photo credit: USGS

[weather.gov/flood](https://weather.gov/flood)





# Current Key NWS Products

- Hazardous Weather Outlook (HWO)
  - [Middle TN Hazardous Weather Report](#)
- Flood Potential Outlooks (ESF)
- Flood/Flash Flood Watches (FFA)
- Flood/Flash Flood Warnings (FFW)
  - Dam Break – Downstream will be a Flash Flood Warning
- Flood Statements (FLS)
- Flood Advisories (FAY)
- Urban and Small Stream (FAY)





# Hazardous Weather Outlook

## HWO



FLUS44 KOHX 070643  
HWOOHX

Hazardous Weather Outlook  
National Weather Service Nashville TN  
1241 AM CST Tue Nov 7 2017

TNZ005>011-023>034-056>066-075-077>080-093>095-071130-  
Stewart-Montgomery-Robertson-Sumner-Macon-Clay-Pickett-Houston-  
Humphreys-Dickson-Cheatham-Davidson-Wilson-Trousdale-Smith-  
Jackson-Putnam-Overton-Fentress-Perry-Hickman-Lewis-Williamson-  
Maury-Marshall-Rutherford-Cannon-De Kalb-White-Cumberland-Bedford-  
Coffee-Warren-Grundy-Van Buren-Wayne-Lawrence-Giles-  
1241 AM CST Tue Nov 7 2017

This Hazardous Weather Outlook is for portions of Middle  
Tennessee.

.DAY ONE...Overnight

Strong thunderstorms producing heavy rainfall are possible in all  
but extreme southern Middle Tennessee, and some flooding is possible  
as rainfall amounts accumulate.

.DAYS TWO THROUGH SEVEN...Tuesday through Sunday

No hazardous weather is expected at this time.

.SPOTTER INFORMATION STATEMENT...

Spotter reports of flooding may be needed.

\$\$

FLUS44 KOHX 071152  
HWOOHX

Hazardous Weather Outlook  
National Weather Service Nashville TN  
552 AM CST Tue Nov 7 2017

TNZ005>011-023>034-056>066-075-077>080-093>095-081200-  
Stewart-Montgomery-Robertson-Sumner-Macon-Clay-Pickett-Houston-  
Humphreys-Dickson-Cheatham-Davidson-Wilson-Trousdale-Smith-  
Jackson-Putnam-Overton-Fentress-Perry-Hickman-Lewis-Williamson-  
Maury-Marshall-Rutherford-Cannon-De Kalb-White-Cumberland-Bedford-  
Coffee-Warren-Grundy-Van Buren-Wayne-Lawrence-Giles-  
552 AM CST Tue Nov 7 2017

This Hazardous Weather Outlook is for portions of Middle  
Tennessee.

.DAY ONE...Today and Tonight

Heavy rainfall overnight has caused significant flooding along a  
corridor that extends from Waverly, to Dickson, to Fairview, to  
Brentwood and South Nashville, to Smyrna, to Watertown, to  
Smithville, to Sparta, to Crossville. Rainfall amounts of 2 to 5  
inches are common in these areas. Flood waters will begin to  
subside once rain exits the region later this morning.

.DAYS TWO THROUGH SEVEN...Wednesday through Monday

No hazardous weather is expected at this time.

.SPOTTER INFORMATION STATEMENT...

Spotter reports are needed this morning.

\$\$



# Middle TN Hazardous Weather Report



<https://www.weather.gov/media/ohx/briefing/SitRep.pdf>



## Forecast Summary

- Sunny, warm through Tuesday.
- Showers and a few thunderstorms return Wednesday thru Thursday night
- Nice weekend, but small chance for a shower Sunday

## Upcoming NWS Nashville Events

Weather101 Continues:

- Monday at 7 pm: Severe Thunderstorms: What is Needed?
- Tuesday and Thursday at 7 pm: Flash Flooding: The Forgotten Severe Weather Element
- Register here: [Weather101](#)





# Hydrologic Outlook ESF



FGUS74 KOHX 272034

ESFOHX

TNZ005>011-023>034-056>066-075-077>080-093>095-281100-

Hydrologic Outlook

National Weather Service Nashville TN

334 PM CDT Sun May 27 2018

...Remnants of Subtropical Storm Alberto to Soak the Mid-State  
Tuesday and Wednesday...

The remnants of Subtropical Storm Alberto will move across Middle Tennessee Tuesday and Wednesday, and bring along some heavy downpours. Since the low pressure center is still expected to track close to Interstate 65, it looks like the heaviest rainfall will occur over western sections of the Mid-State, generally between Interstate 65 and the Tennessee River. This includes areas around Nashville, Clarksville, Dickson, Columbia and Waynesboro.

Between two and three inches of rain are likely to fall over western Middle Tennessee Tuesday and Wednesday, with locally higher amounts to around four inches.

Training of heavy showers will be likely, especially Tuesday afternoon and Tuesday night, and this will produce the possibility of localized flooding. In addition, heavy rain amounts will cause some creeks and streams in the Mid-State to run near bankfull. Right now it looks like the heaviest rains will occur over western Middle Tennessee. However, if the track of the low pressure system shifts further to the east, the area of heaviest rains will shift eastward as well.

\$\$



# Flood/Flash Flood Watch FLA



FFAOHX

Flood Watch  
National Weather Service Nashville TN  
355 PM CDT Tue May 29 2018

...Periods of Heavy Rainfall Are Expected Today into Tonight  
Across Middle Tennessee...

.Subtropical Depression Alberto is expected to approach and move across mid state through tomorrow morning. Storm total rainfall amounts 1.5 to 3.0 inches possible, with locally higher amounts approaching 4.0 inches near TN River Valley Region. One concern associated with tropical weather systems is likelihood for heavy showers training over the same area. Heavy rainfall can accumulate quickly and lead to possible flash flooding across these areas. Locations that have received saturating rainfall amounts over the previous few days could also be more prone to flash flooding.

TNZ005>011-023>034-056>066-075-077>080-093>095-301200-  
/O.CON.KOHX.FF.A.0001.000000T0000Z-180530T1200Z/  
/00000.0.ER.000000T0000Z.000000T0000Z.000000T0000Z.OO/  
Stewart-Montgomery-Robertson-Sumner-Macon-Clay-Pickett-Houston-  
Humphreys-Dickson-Cheatham-Davidson-Wilson-Trousdale-Smith-  
Jackson-Putnam-Overton-Fentress-Perry-Hickman-Lewis-Williamson-  
Maury-Marshall-Rutherford-Cannon-De Kalb-White-Cumberland-Bedford-  
Coffee-Warren-Grundy-Van Buren-Wayne-Lawrence-Giles-  
Including the cities of Dover, Clarksville, Springfield,  
Hendersonville, Gallatin, Goodlettsville, Lafayette, Celina,  
Byrdstown, Erin, Waverly, New Johnsonville, McEwen, Dickson,  
Ashland City, Kingston Springs, Nashville, Lebanon, Mount Juliet,  
Hartsville, Carthage, South Carthage, Gordonsville, Gainesboro,  
Cookeville, Livingston, Jamestown, Allardt, Linden, Lobelville,  
Centerville, Hohenwald, Franklin, Brentwood, Columbia, Lewisburg,  
Murfreesboro, Smyrna, La Vergne, Woodbury, Smithville, Sparta,  
Crossville, Shelbyville, Tullahoma, Manchester, McMinnville,  
Altamont, Coalmont, Spencer, Clifton, Waynesboro, Lawrenceburg,  
and Pulaski  
355 PM CDT Tue May 29 2018

...FLASH FLOOD WATCH REMAINS IN EFFECT THROUGH WEDNESDAY  
MORNING...

The Flash Flood Watch continues for

\* A portion of Middle Tennessee, including the following areas,  
Bedford, Cannon, Cheatham, Clay, Coffee, Cumberland, Davidson,

3/21/2018

De Kalb, Dickson, Fentress, Giles, Grundy, Hickman, Houston,  
Humphreys, Jackson, Lawrence, Lewis, Macon, Marshall, Maury,  
Montgomery, Overton, Perry, Pickett, Putnam, Robertson,  
Rutherford, Smith, Stewart, Sumner, Trousdale, Van Buren,  
Warren, Wayne, White, Williamson, and Wilson.

\* Through Wednesday morning

\* Average rainfall amounts of one to three inches, with locally  
higher amounts approaching four inches.

\* Some flash flooding is possible. In addition, you can expect  
rises to occur on area creeks and streams, and possibly along  
larger rivers as well.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

WGUS64 KOHX 281707  
FFAOHX

URGENT - IMMEDIATE BROADCAST REQUESTED  
Flood Watch  
National Weather Service Nashville TN  
1207 PM CDT Thu Jun 28 2018

...Heavy Thunderstorm Rains May Produce Flash Flooding Today...

.Several episodes of heavy thunderstorm rains are expected this  
afternoon over southern and western parts of Middle Tennessee,  
producing the potential for rain totals of 3 to 5 inches and  
localized flash flooding.

TNZ023>025-056>061-075-077-093>095-290000-  
/O.NEW.KOHX.FF.A.0002.180628T1707Z-180629T0000Z/  
/00000.0.ER.000000T0000Z.000000T0000Z.000000T0000Z.OO/  
Houston-Humphreys-Dickson-Perry-Hickman-Lewis-Williamson-Maury-  
Marshall-Bedford-Coffee-Wayne-Lawrence-Giles-  
Including the cities of Erin, Waverly, New Johnsonville, McEwen,  
Dickson, Linden, Lobelville, Centerville, Hohenwald, Franklin,  
Brentwood, Columbia, Lewisburg, Shelbyville, Tullahoma,  
Manchester, Clifton, Waynesboro, Lawrenceburg, and Pulaski  
1207 PM CDT Thu Jun 28 2018

...FLASH FLOOD WATCH IN EFFECT UNTIL 7 PM CDT THIS EVENING...

The National Weather Service in Nashville has issued a

\* Flash Flood Watch for a portion of Middle Tennessee, including  
the following areas, Bedford, Coffee, Dickson, Giles, Hickman,  
Houston, Humphreys, Lawrence, Lewis, Marshall, Maury, Perry,  
Wayne, and Williamson.

\* Until 7 PM CDT this evening

\* Several periods of heavy thunderstorm rains with potential  
totals of 3 to 5 inches.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

3/21/2018

A Flash Flood Watch means that conditions may develop that lead  
to flash flooding. Flash flooding is a very dangerous situation.

You should monitor later forecasts and be prepared to take action  
should Flash Flood Warnings be issued.

&&

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# River Flood Warning FLW



WGUS44 KOHX 070604

FLWOHX

Bulletin - Immediate Broadcast Requested

Flood Warning

National Weather Service Nashville TN

1204 AM CST Tue Nov 7 2017

...The National Weather Service in Nashville, Tn has issued a flood warning for the following rivers in middle Tennessee...

Richland Creek At Belle Meade Near Harding Place AFFECTING Davidson County

.Thunderstorms with heavy rain have caused creek in southern Davidson County to rise above flood stage.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Avoid flooded areas along the river...And move personal belongings to higher ground. Never drive through flooded roads as the depth of water may be too great to pass...Even in trucks or sport utility vehicles. If you come across a flooded road...Turn around don't drown.

Stay tuned to noaa weather radio or other local media for further information from the National Weather Service.

&&

TNC037-071804-

/O.NEW.KOHX.FL.W.0017.171107T0604Z-000000T0000Z/

/BMDT1.2.ER.171107T0511Z.171107T0545Z.000000T0000Z.UU/

1204 AM CST Tue Nov 7 2017

The National Weather Service in Nashville, Tn has issued a

\* Flood Warning for

The Richland Creek At Belle Meade Near Harding Place

\* From early this morning until further notice.

\* At 11PM Monday the stage was...10.0 feet

\* Flood stage is 7.0 feet.

\* The river will rise to near 11.0 feet then begin falling.

\* At 11.0 feet...The parking lot of Belle Meade Terrace condominiums begins to flood.

\* At 10.0 feet...The parking area near the creek and Harding Place begins to be flooded.

&&

LAT...LON 3606 8690 3617 8689 3616 8683 3606 8680

\$\$

Shamburger



# River Flood Warning Follow Up

## FLS



WGUS84 KOHX 071427

FLSOHX

Flood Statement

National Weather Service Nashville TN

827 AM CST Tue Nov 7 2017

...The flood warning is cancelled for the following rivers in Tennessee...

Richland Creek At Belle Meade Near Harding Place AFFECTING Davidson County

.Water levels on Richland Creek will continue to subside this morning, and the Flood Warning has been cancelled.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Avoid flooded areas along the river...And move personal belongings to higher ground. Never drive through flooded roads as the depth of water may be too great to pass...Even in trucks or sport utility vehicles. If you come across a flooded road...Turn around don't drown.

Stay tuned to noaa weather radio or other local media for further information from the National Weather Service.

&&

TNC037-071457-

/O.CAN.KOHX.FL.W.0017.000000T0000Z-171107T1427Z/

/BMDT1.2.ER.171107T0511Z.171107T0605Z.171107T0820Z.UU/

827 AM CST Tue Nov 7 2017

The Flood Warning is cancelled for

The Richland Creek At Belle Meade Near Harding Place

\* Until 12/31 17:59.

\* At 07AM Tuesday the stage was 4.0 feet and falling.

\* Flood stage is 7.0 feet.

\* Water levels have fallen below Flood Stage and will continue to subside this morning.

&&

LAT...LON 3606 8690 3617 8689 3616 8683 3606 8680





# River Flood Advisory FLS



WGUS84 KOHX 070606  
FLSOHX  
Flood Advisory  
National Weather Service Nashville TN  
1206 AM CST Tue Nov 7 2017

...The National Weather Service in Nashville, Tn has issued a flood advisory for the following rivers in middle Tennessee...

Sevenmile Creek At Blackman Road - Nashville AFFECTING Davidson County

.Thunderstorms with heavy rain have caused creek in southern Davidson County to rise above flood stage.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Stay tuned to noaa weather radio or other local media for further information from the National Weather Service.

&&

TNC037-071806-  
/O.NEW.KOHX.FL.Y.0044.171107T0606Z-171108T1804Z/  
/SVCT1.N.ER.000000T0000Z.000000T0000Z.000000T0000Z.00/  
1206 AM CST Tue Nov 7 2017

The National Weather Service in Nashville, Tn has issued a  
\* Flood Advisory for  
The Sevenmile Creek At Blackman Road - Nashville  
\* At 11PM Monday the stage was 7.0 feet.  
\* Flood stage is 9.0 feet.  
\* The river will rise to near 9.0 feet then begin falling.

\$\$





# Flash Flood Warning

## FFW



FFWOHX  
TNC041-071445-  
/O.NEW.KOHX.FF.W.0033.171107T1144Z-171107T1445Z/  
/00000.0.ER.000000T0000Z.000000T0000Z.000000T0000Z.00/

BULLETIN - EAS ACTIVATION REQUESTED  
Flash Flood Warning  
National Weather Service Nashville TN  
544 AM CST TUE NOV 7 2017

The National Weather Service in Nashville has issued a

- \* Flash Flood Warning for...  
De Kalb County in Middle Tennessee...

- \* Until 845 AM CST

- \* At 541 AM CST, emergency management reported water rescues in the city of Dowelltown due to high water from overnight thunderstorms. Since yesterday afternoon, 3 to 5 inches of rain have fallen across a broad area in DeKalb County, and additional rainfall is occurring this morning.

- \* Some locations that will experience flooding include...  
Smithville, Alexandria, Dowelltown, Liberty, Center Hill Lake and Edgar Evans State Park.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Turn around, don't drown when encountering flooded roads. Most flood deaths occur in vehicles.

&&

LAT...LON 3609 8577 3607 8576 3607 8575 3601 8565  
3595 8566 3590 8565 3589 8567 3589 8565  
3587 8565 3586 8566 3585 8565 3586 8567  
3585 8567 3586 8590 3589 8593 3607 8605  
3609 8587 3611 8581

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# Flash Flood Warning Follow Up

## FFS



WGUS74 KOHX 171205

FFSOHX

Flash Flood Statement

National Weather Service Nashville TN

705 AM CDT FRI AUG 17 2018

TNC111-169-171345-

/O.CON.KOHX.FF.W.0024.000000T0000Z-180817T1345Z/

/00000.0.ER.000000T0000Z.000000T0000Z.000000T0000Z.00/

Macon TN-Trousdale TN-

705 AM CDT FRI AUG 17 2018

...THE FLASH FLOOD WARNING REMAINS IN EFFECT UNTIL 845 AM CDT FOR  
SOUTHEASTERN MACON AND CENTRAL TROUSDALE COUNTIES...

At 702 AM CDT, local law enforcement has reported several roads  
flooded across Macon and Trousdale counties. While rains are  
slowing, up to four inches of rain have already fallen and it will  
take awhile for waters to recede. Please use extreme caution on  
roads in Macon and Trousdale counties over the next couple of hours.

Some locations that will experience flooding include...  
Lafayette, Hartsville and Red Boiling Springs.

PRECAUTIONARY/PREPAREDNESS ACTIONS...



# Flood Advisory (Not River)

## FA.Y



WGUS84 KOHX 070426  
FLSOHX

Flood Advisory  
National Weather Service Nashville TN  
1026 PM CST MON NOV 6 2017

TNC021-037-043-187-070630-  
/O.NEW.KOHX.FA.Y.0091.171107T0426Z-171107T0630Z/  
/00000.N.ER.000000T0000Z.000000T0000Z.000000T0000Z.OO/  
Davidson TN-Dickson TN-Williamson TN-Cheatham TN-  
1026 PM CST MON NOV 6 2017

The National Weather Service in Nashville has issued a

- \* Flood Advisory for...  
Southern Davidson County in Middle Tennessee...  
Southern Dickson County in Middle Tennessee...  
Northern Williamson County in Middle Tennessee...  
South central Cheatham County in Middle Tennessee...
- \* Until 1230 AM CST
- \* At 1025 PM CST, Doppler radar indicated heavy rain due to thunderstorms continuing to move across the area. Radar estimates up to 2 inches of rain has fallen in the past hour from Dickson to Kingston Springs to Brentwood. This will cause minor flooding in the advisory area.
- \* Some locations that will experience flooding include...  
Franklin, Dickson, Brentwood, Nolensville, Forest Hills, Oak Hill, White Bluff, Belle Meade, Kingston Springs, Pegram, Burns, Bellevue, Antioch, Fairview, Charlotte, Berry Hill, Bells Bend and Natchez Trace At Highway 96.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be especially cautious at night when it is harder to recognize the dangers of flooding.

&&





# Flood Advisory (Not River) Follow Up FA.Y



WGUS84 KOHX 070508  
FLSOHX

Flood Advisory  
National Weather Service Nashville TN  
1108 PM CST MON NOV 6 2017

TNC021-037-043-187-070630-  
/O.CON.KOHX.FA.Y.0091.000000T0000Z-171107T0630Z/  
/00000.N.ER.000000T0000Z.000000T0000Z.000000T0000Z.OO/  
Davidson TN-Dickson TN-Williamson TN-Cheatham TN-  
1108 PM CST MON NOV 6 2017

...THE FLOOD ADVISORY REMAINS IN EFFECT UNTIL 1230 AM CST FOR  
SOUTHERN DAVIDSON...SOUTHERN DICKSON...NORTHERN WILLIAMSON AND SOUTH  
CENTRAL CHEATHAM COUNTIES...

At 1105 PM CST, trained weather spotters and the public reported  
street flooding in Brentwood and Bellevue due to thunderstorms  
continuing to move across the area. Radar estimates two to three  
inches of rain has fallen this evening. Minor flooding is expected  
to continue in the advisory area for another 1 to 2 hours.

Some locations that will experience flooding include...  
Franklin, Dickson, Brentwood, Nolensville, Forest Hills, Oak Hill,  
White Bluff, Belle Meade, Kingston Springs, Pegram, Burns, Bellevue,  
Antioch, Fairview, Charlotte, Berry Hill, Bells Bend and Natchez  
Trace At Highway 96.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be especially cautious at night when it is harder to recognize the  
dangers of flooding.

&&



# Urban and Small Stream FA.Y



Flood Advisory  
National Weather Service Nashville TN  
559 PM CDT FRI AUG 17 2018

TNC061-180200-  
/O.NEW.KOHX.FA.Y.0103.180817T2259Z-180818T0200Z/  
/00000.N.ER.000000T0000Z.000000T0000Z.000000T0000Z.OO/  
Grundy TN-  
559 PM CDT FRI AUG 17 2018

The National Weather Service in Nashville has issued a

- \* Urban and Small Stream Flood Advisory for...  
Central and Southeastern Grundy County in Middle Tennessee...
- \* Until 900 PM CDT.
- \* At 559 PM CDT, Doppler radar indicated heavy rain due to thunderstorms continuing to move into the county. This will cause urban and small stream flooding in the advisory area. Doppler radar estimates up to locally two inches of rain have already fallen. The potential of up to another two inches of rainfall falling in isolated locations across central and southeastern portions of Grundy County that have already received rainfall as the afternoon hours have progressed.
- \* Some locations that will experience flooding include...  
Gruetli-Laager, Tracy City, Monteagle, Coalmont, Palmer, Pelham and Fiery Gizzard State Park.

This includes Interstate 24 between mile markers 128 and 134.

## PRECAUTIONARY/PREPAREDNESS ACTIONS...

In hilly terrain there are hundreds of low water crossings which are potentially dangerous in heavy rain. Do not attempt to cross flooded roads. Find an alternate route.

A Flood Advisory means river or stream flows are elevated, or ponding of water in urban or other areas is occurring or is imminent.

&&

LAT...LON 3524 8582 3523 8588 3524 8588 3530 8590  
3549 8554 3543 8554 3540 8549 3536 8551





# Confused Yet?!?

## HazSimp

Last year there was a proposed Simplification & Consolidation of Flood Watches, Warnings & Advisories

<https://www.weather.gov/hazardsimplification/>





# New Impact-Based Warning “Standard FFW”

## Flash Flood Warning – No Damage Threat Tag...Base

### Current Product

WGUS55 KBOU 250327  
FFWB0U  
COC087-250600-  
/O.NEW.KBOU.FF.W.0011.180725T0327Z-180725T0600Z/  
/00000.0.ER.000000T0000Z.000000T0000Z.000000T0000Z.CC/

BULLETIN - EAS ACTIVATION REQUESTED  
Flash Flood Warning  
National Weather Service Denver CO  
927 PM MDT TUE JUL 24 2018

The National Weather Service in Denver Colorado has issued a

\* Flash Flood Warning for...  
North central Morgan County in northeastern Colorado...

\* Until midnight MDT.

\* At 926 PM MDT, Doppler radar indicated thunderstorms producing very heavy rain over Fort Morgan. The rain is moving south at 5 mph. Up to three inches of rain have already fallen north of Fort Morgan, while the town of Fort Morgan may see up to 2 inches in 30 minutes. Flash flooding is expected to begin shortly.

\* Some locations that will experience flooding include...  
Fort Morgan and Log Lane Village.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be especially cautious at night when it is harder to recognize the dangers of flooding.

Excessive runoff from heavy rainfall will cause flooding of small creeks and streams, highways and underpasses. Additionally, country roads and farmlands along the banks of creeks, streams and other low lying areas are subject to flooding.

66

LAT...LON 4046 10398 4048 10378 4023 10378 4030 10389

\$\$

### Product in IBW Format

WGUS55 KBOU 250327  
FFWB0U  
COC087-250600-  
/O.NEW.KBOU.FF.W.0011.180725T0327Z-180725T0600Z/  
/00000.0.ER.000000T0000Z.000000T0000Z.000000T0000Z.CC/

BULLETIN - EAS ACTIVATION REQUESTED  
Flash Flood Warning  
National Weather Service Denver CO  
927 PM MDT TUE JUL 24 2018

The National Weather Service in Denver Colorado has issued a

\* Flash Flood Warning for...  
North central Morgan County in northeastern Colorado...

\* Until midnight MDT.

\* At 926 PM MDT, Doppler radar indicated thunderstorms producing very heavy rain over Fort Morgan. The rain is moving south at 5 mph. Up to three inches of rain have already fallen north of Fort Morgan. The town of Fort Morgan may see rainfall rates of 2 to 3 inches in 30 minutes. Flash flooding is expected to begin shortly.

HAZARD...Flash flooding caused by heavy rain.

SOURCE...Radar rainfall estimates.

IMPACT...Flash flooding of small creeks and streams, highways and underpasses.

\* Some locations that will experience flooding include...  
Fort Morgan and Log Lane Village.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Be especially cautious at night when it is harder to recognize the dangers of flooding.

66

LAT...LON 4046 10398 4048 10378 4023 10378 4030 10389

FLASH FLOOD...RADAR INDICATED  
EXPECTED RAINFALL...2 INCHES IN 30 MINUTES

HAZARD...Flash flooding caused by heavy rain.

SOURCE...Radar rainfall estimates.

IMPACT...Flash flooding of small creeks and streams, highways and underpasses.

No Flash Flood  
Damage Threat tag



# New Impact-Based Warning “Damage Threat Considerable FFW”

## Flash Flood Warning – Damage Threat...Considerable

### Current Product

WGUS52 KMHX 150702  
FFWMHX  
NCC013-049-103-107-151000-  
/O.NEW.KMHX.FF.W.0017.180915T0702Z-180915T1000Z/  
/00000.O.ER.00000T0000Z.00000T0000Z.00000T0000Z.CO/

BULLETIN - EAS ACTIVATION REQUESTED  
Flash Flood Warning  
National Weather Service Newport/Morehead City NC  
302 AM EDT SAT SEP 15 2018

The National Weather Service in Newport has issued a

- \* Flash Flood Warning for...  
Northeastern Jones County in eastern North Carolina...  
Northern Lenoir County in eastern North Carolina...  
Craven County in eastern North Carolina...  
Southwestern Beaufort County in eastern North Carolina...
- \* Until 600 AM EDT.
- \* At 254 AM EDT, emergency management reported flash flooding from rain bands associated with Tropical Storm Florence. Around 9 to 13 inches of rain have fallen since Thursday, and an additional 2 to 4 inches are possible across the warned area over the next hour.
- \* Some locations that will experience flooding include...  
New Bern, Kinston, La Grange, River Bend, Grifton, Blounts Creek, Vanceboro, Askins, Clayton, Fort Barnwell, Jasper, Tuscarora, Dawson, Rhems, Wilmar, Edward, Graingers, Institute, Cox Crossroads and Wyse Fork.

#### PRECAUTIONARY/PREPAREDNESS ACTIONS...

Turn around, don't drown when encountering flooded roads. Most flood deaths occur in vehicles.

Be especially cautious at night when it is harder to recognize the dangers of flooding.

66

LAT...LON 3537 7780 3538 7770 3535 7767 3543 7748  
3535 7743 3533 7738 3533 7735 3538 7729  
3535 7725 3539 7724 3542 7719 3553 7716  
3530 7677 3524 7687 3525 7690 3523 7694  
3518 7697 3506 7717 3529 7782 3531 7783

\$\$

### Product in IBW Format

WGUS52 KMHX 150702  
FFWMHX  
NCC013-049-103-107-151000-  
/O.NEW.KMHX.FF.W.0017.180915T0702Z-180915T1000Z/  
/00000.O.ER.00000T0000Z.00000T0000Z.00000T0000Z.CO/

BULLETIN - EAS ACTIVATION REQUESTED  
Flash Flood Warning  
National Weather Service Newport/Morehead City NC  
302 AM EDT SAT SEP 15 2018

The National Weather Service in Newport has issued

- \* Flash Flood Warning for...  
Northeastern Jones County in eastern North Carolina...  
Northern Lenoir County in eastern North Carolina...  
Craven County in eastern North Carolina...  
Southwestern Beaufort County in eastern North Carolina...
- \* Until 600 AM EDT.
- \* At 254 AM EDT, emergency management reported 2 to 4 inches of rain have fallen since Thursday, and 4 inches are possible across the warned area over the next hour.
- \* HAZARD...Flash flooding caused by heavy rain.
- \* SOURCE...Emergency management.
- \* IMPACT...Life-threatening flash flooding of creeks and streams, urban areas, highways, streets, and underpasses.
- \* Some locations that will experience flooding include...  
New Bern, Kinston, La Grange, River Bend, Grifton, Blounts Creek, Vanceboro, Askins, Clayton, Fort Barnwell, Jasper, Tuscarora, Dawson, Rhems, Wilmar, Edward, Graingers, Institute, Cox Crossroads and Wyse Fork.

#### PRECAUTIONARY/PREPAREDNESS ACTIONS...

Turn around, don't drown when encountering flooded roads. Most flood deaths occur in vehicles.

Be especially cautious at night when it is harder to recognize the dangers of flooding.

66

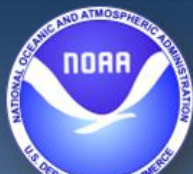
LAT...LON 3537 7780 3538 7770 3535 7767 3543 7748  
3535 7743 3533 7738 3533 7735 3538 7729  
3535 7725 3539 7724 3542 7719 3553 7716  
3530 7677 3524 7687 3525 7690 3523 7694  
3518 7697 3506 7717 3529 7782 3531 7783

FLASH FLOOD...OBSERVED

FLASH FLOOD DAMAGE THREAT...CONSIDERABLE

66





# New Impact-Based Warning “Damage Threat Catastrophic FFW”

## Flash Flood Warning – Damage Threat...Catastrophic

### Current Product

```
WGUS24 NRGX 271826
FFWGGX
TXC015-039-071-157-167-185-201-201-339-473-477-280015-
/O.NEW.NRGX.FF.W.0079.1708271826S-17082870015Z/
/00000.0.ZZ.000000000002.000000000002.000000000002.00/
```

BULLETIN - EAS ACTIVATION REQUESTED  
Flash Flood Warning  
National Weather Service Houston/Galveston TX  
126 PM CDT SUN AUG 27 2017

...FLASH FLOOD EMERGENCY FOR LIFE-THREATENING CATASTROPHIC  
FLOODING...

The National Weather Service in League City has issued a

\* Flash Flood Warning for...  
Northeastern Austin County in southeastern Texas...  
Southeastern Grimes County in southeastern Texas...  
Southeastern Washington County in southeastern Texas...  
Galveston County in southeastern Texas...  
Southern Montgomery County in southeastern Texas...  
Central Fort Bend County in southeastern Texas...  
Northeastern Brazoria County in southeastern Texas...  
Western Chambers County in southeastern Texas...  
Waller County in southeastern Texas...  
West central Liberty County in southeastern Texas...  
Harris County in southeastern Texas...

\* Until 715 PM CDT.

\* At 119 PM CDT, Doppler radar indicated continued bands of rain and  
thunderstorms across the area. Emergency management reported ongoing  
water rescues. Widespread flooding will continue and perhaps worsen  
at some locations. Historic flooding is expected to continue in the  
Houston metropolitan area through the foreseeable future.

This is a FLASH FLOOD EMERGENCY FOR LIFE-THREATENING CATASTROPHIC  
FLOODING. This is a PARTICULARLY DANGEROUS SITUATION. SEEK HIGHER  
GROUND NOW!

\* Some locations that will experience flooding include...  
Pasadena, Pearland, League City, Sugar Land, Baytown, Missouri  
City, Galveston Island West End, Galveston Causeway, Texas City,  
Friendswood, La Porte, Clear Park, Rosenberg, Alvin, northwestern  
Angleton, Dickinson, Stafford, South Houston, Bellaire and Humble.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Move to higher ground now. This is an extremely dangerous and  
life-threatening situation. Do not attempt to travel unless you are  
fleeing an area subject to flooding or under an evacuation order.

##

LAT...LOW 2904 9515 2905 9527 2932 9536 2916 9543  
2919 9556 2947 9569 2921 9584 3010 9627  
3036 9590 3012 9541 3010 9515 3014 9507  
2933 9483

##

### Product in IBW Format

```
WGUS24 NRGX 271826
FFWGGX
TXC015-039-071-157-167-185-201-201-339-473-477-280015-
/O.NEW.NRGX.FF.W.0079.1708271826S-17082870015Z/
/00000.0.ZZ.000000000002.000000000002.000000000002.00/
```

BULLETIN - EAS ACTIVATION REQUESTED  
Flash Flood Warning  
National Weather Service Houston/Galveston TX  
126 PM CDT SUN AUG 27 2017

...FLASH FLOOD EMERGENCY FOR LIFE-  
FLOODING...

The National Weather Service in League City has is

\* Flash Flood Warning for...  
Northeastern Austin County in southeastern Texas...  
Southeastern Grimes County in southeastern Texas...  
Southeastern Washington County in southeastern Texas...  
Galveston County in southeastern Texas...  
Southern Montgomery County in southeastern Texas...  
Central Fort Bend County in southeastern Texas...  
Northeastern Brazoria County in southeastern Texas...  
Western Chambers County in southeastern Texas...  
Waller County in southeastern Texas...  
West central Liberty County in southeastern Texas...  
Harris County in southeastern Texas...

\* Until 715 PM CDT.

\* At 119 PM CDT, Doppler radar indicated continued bands of rain and  
thunderstorms across the area. Emergency management reported ongoing  
water rescues.

This is a FLASH FLOOD EMERGENCY FOR LIFE-THREATENING CATASTROPHIC  
FLOODING. This is a PARTICULARLY DANGEROUS SITUATION. SEEK HIGHER  
GROUND NOW!

HAZARD...Life-threatening flash flooding caused by heavy rain.

SOURCE...Emergency management.

IMPACT...Widespread, life-threatening flooding will continue and  
perhaps worsen at some locations. Historic flooding is  
expected to continue in the Houston metropolitan area through  
the foreseeable future.

\* Some locations that will experience flooding include...  
Pasadena, Pearland, League City, Sugar Land, Baytown, Missouri  
City, Galveston Island West End, Galveston Causeway, Texas City,  
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2933 9483

FLASH FLOOD...OBSERVED

FLASH FLOOD DAMAGE THREAT...CATASTROPHIC



# New Impact-Based Warning

## “Damage Threat Flash Flood Emergency”

### Flash Flood Statement for Flash Flood Emergency

#### Current Product

WCUS71 KLMX 272040  
FFSLMX

Flash Flood Statement  
National Weather Service Baltimore MD/Washington DC  
440 PM EDT SUN MAY 27 2018

MDC005-027-272330-  
/O.CON.KLMX.FF.W.0017.000000T0000Z-180527T2330Z/  
/00000.O.EA.000000T0000Z.000000T0000Z.000000T0000Z.00/  
Howard MD-Baltimore MD-  
440 PM EDT SUN MAY 27 2018

...THIS IS A FLASH FLOOD EMERGENCY FOR Ellicott City in Howard County...

...THE FLASH FLOOD WARNING REMAINS IN EFFECT UNTIL 730 PM EDT FOR EAST CENTRAL HOWARD AND SOUTHWESTERN BALTIMORE COUNTIES...

At 439 PM EDT, Emergency Management reported multiple water rescues on Main Street in Ellicott City. Rainfall rates of 2-4 inches per hour are expected. Seek higher ground immediately.

This is a FLASH FLOOD EMERGENCY for Ellicott City in Howard County. This is a PARTICULARLY DANGEROUS SITUATION. SEEK HIGHER GROUND NOW!

Some locations that will experience flooding include...  
Ellicott City, Catonsville, Woodlawn, Arbutus, Ellicott City and Oella.

PRECAUTIONARY/PREPAREDNESS ACTIONS...

Move to higher ground now. This is an extremely dangerous and life-threatening situation. Do not attempt to travel unless you are fleeing an area subject to flooding or under an evacuation order.

Turn around, don't drown when encountering flooded roads. Most flood deaths occur in vehicles.

Move to higher ground now. Act quickly to protect your life.

##

LAT...LON 3928 7671 3927 7670 3924 7670 3924 7678  
3925 7687 3927 7688 3931 7671

\$\$

#### Product in IBW Format

WCUS71 KLMX 272040  
FFSLMX

Flash Flood Statement  
National Weather Service Baltimore MD/Washington DC  
440 PM EDT SUN MAY 27 2018

MDC005-027-272330-  
/O.CON.KLMX.FF.W.0017.000000T0000Z-180527T2330Z/  
/00000.O.EA.000000T0000Z.000000T0000Z.000000T0000Z.00/  
Howard MD-Baltimore MD-  
440 PM EDT SUN MAY 27 2018

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LAT...LON 3928 7671 3927 7670 3924 7670 3924 7678  
3925 7687 3927 7688 3931 7671

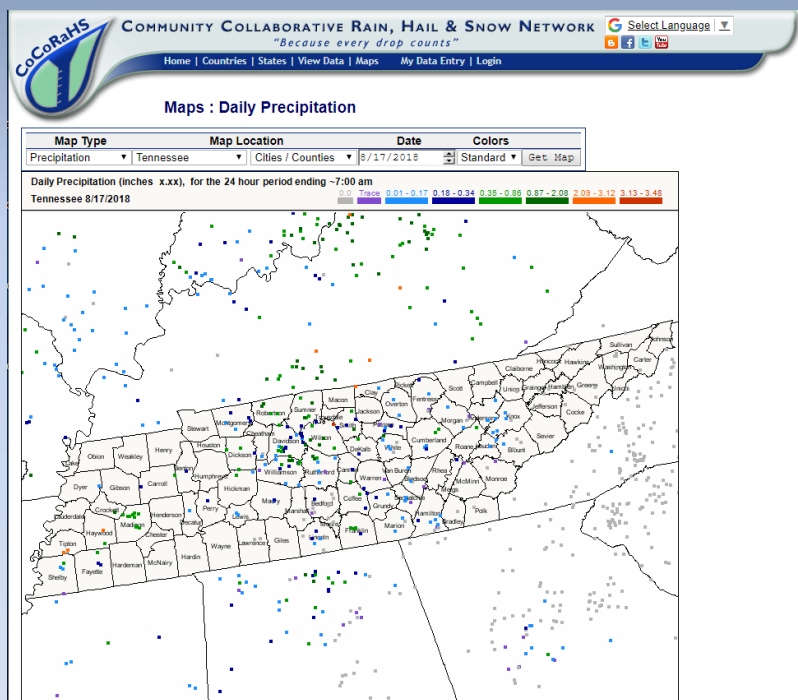
FLASH FLOOD...OBSERVED  
FLASH FLOOD DAMAGE THREAT...CATASTROPHIC  
EXPECTED RAINFALL...2-4 INCHES PER HOUR

\$\$



# CoCoRaHS

## Help us with rainfall reports – Become a CoCoRaHS observer



## What is CoCoRaHS?

CoCoRaHS is a national grassroots,  
non-profit, community-based,  
high-density precipitation network ...

... made up of volunteers of  
all ages and backgrounds



... who take daily measurements of  
precipitation right in their own backyards

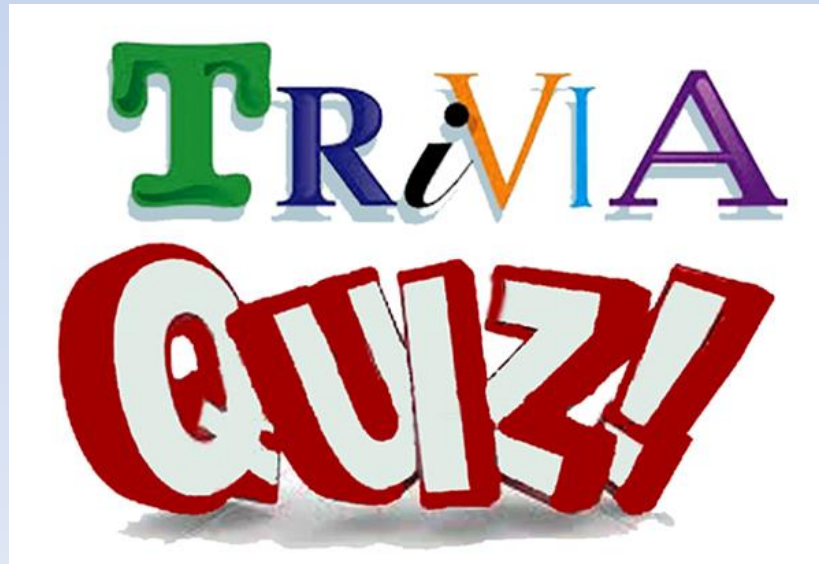
<https://www.cocorahs.org/>





# True or False

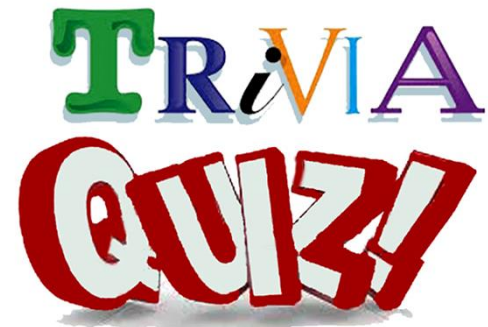
- If I drive a pickup truck or large SUV, will this keep me safe from river flooding or flash flooding.





# True or False

- False!!!!
- As little as 6-12" of fast moving water can sweep most any vehicle off a roadway. Besides, you can't determine the condition of the road bed under the water. The road could be washed out, or the water could be hiding a huge sinkhole.





# True or False

- A 100-year flood occurs once every 100 years on average?

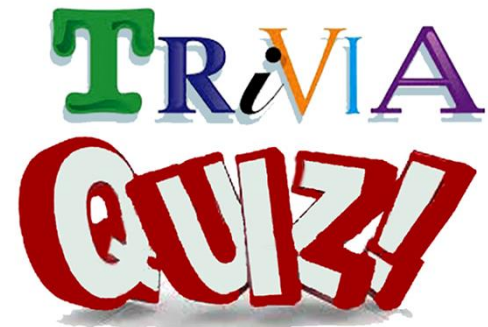
TRIVIA  
QUIZ!





# True or False

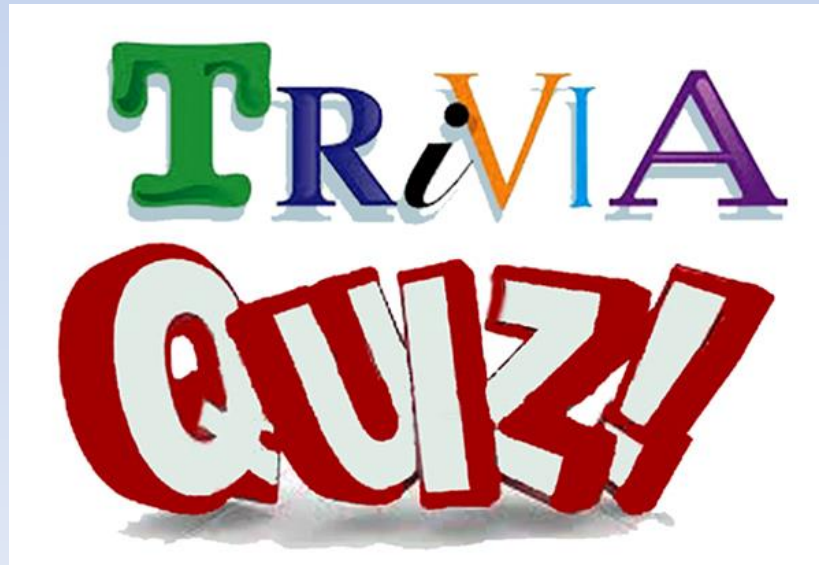
- False!!!!
- The 100-year flood is a climatic average, that there is a 1 in 100% (1 percent) chance of that magnitude of flood occurring in any year.





# True or False

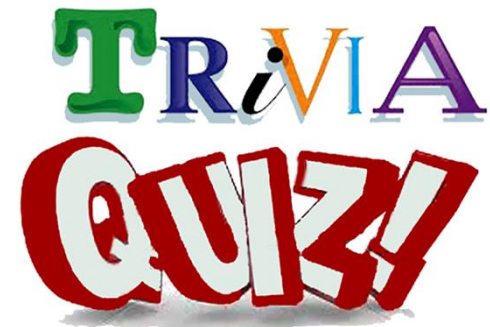
- A 500-year flood would be a 1 in 500% (.2 percent) chance of that magnitude of flood occurring in any year.





# True or False

- True!!!!
- A 500-year flood would be a 1 in 500% (.2 percent) chance of that magnitude of flood occurring in any year.







# Flooding FAQs

- How can I find out if I am in danger from a flood?
  - NOAA Weather Radio, Opt in on cell phone alerts, know your surroundings
- How do I know how severe a flood will be?
  - Once a river reaches flood stage, the flood severity categories used by the NWS include minor flooding, moderate flooding, and major flooding.
    - Minor Flooding – minimal or no property damage, but possibly some public threat or inconvenience (i.e. multiuse fields).
    - Moderate Flooding – some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevation are necessary.
    - Major Flooding – extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevation.



# Upcoming classes

- Fall online spotter season (basic and advanced):  
October and November
  - <https://www.weather.gov/ohx/skywarn>
- Additional 101 Classes  
October, November, and December
  - <https://www.weather.gov/ohx/weather101>
- KennTenn 2019 Workshop  
Saturday November 16<sup>th</sup> at WKU
  - <https://www.weather.gov/lmk/kentenn>
- SWAD2020
- Saturday February 29 at Trevecca University

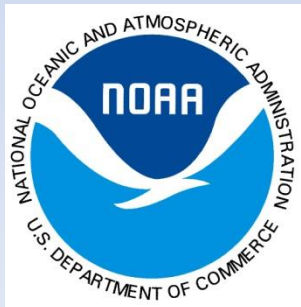


# Questions or Comments?

Email:

Faith Borden – [faith.borden@noaa.gov](mailto:faith.borden@noaa.gov)

Please, send me an email with the number of people in attendance at your computer, if more than one



U.S. Department of Commerce  
National Oceanic and Atmospheric Administration  
National Weather Service – Nashville, TN

